FBIS-CST-96-007
16 May 1996

FOREIGN BROADCAST INFORMATION SERVICE

FBIS Report —

Science & Technology

China

1995 Energy Report of China

(1995 White Paper)

ATTENTION!

SUBSCRIBERS TO FBIS S&T REPORTS

FBIS is conducting a revalidation of all hardcopy subscriptions to FBIS S&T REPORTS. Consequently, all subscribers to FBIS S&T reports must contact FBIS by 30 June 1996 to maintain their subscriptions. **FBIS WILL CANCEL ANY HARDCOPY SUBSCRIPTIONS THAT ARE NOT REVALIDATED.**

Customers may validate subscriptions electronically, via DTS by sending a message to RUCWAAB//FBISReston VA//Customer Service//, by fax to (703) 733-6042, or by mail to P.O. Box 2604, Washington, D.C. 20013. To retain your subscription to one or more of the reports, please use the form below.

Questions about revalidation of subscriptions or softcopy dissemination should be directed to FBIS Customer Service representatives at (202) 338-6735 or 1-800-205-8615.

- -

Agency/Organization:________________________ Office:____________________

Name:____

Telephone No.:______________________ Fax No.:______________________

E-Mail Address:____

Postal Address:____

____

Subscription(s) you wish to retain: ____**FBIS S&T/CHINA** _____**FBIS S&T/CENTRAL EURASIA**
_____**FBIS S&T/KOREA** ______**FBIS S&T/JAPAN** _______**FBIS S&T/EUROPE**

Customer No.: (see back cover of report, above and to the right of zip code) ____________________

What is your primary area/issue of interest? ______________________________

How do you use **FBIS S&T REPORTS?** (e.g., ADP support, reference support, OPS/info collection, analysis, production support, policy support, policy making, etc.) ______________________________

Comments: ____

Science & Technology

China

1995 Energy Report of China (1995 White Paper)

FBIS-CST-96-007 *16 May 1996*

CONTENTS

1995 Energy Report of China (1995 White Paper)

40101001A Beijing 1995 ENERGY REPORT OF CHINA (1995 WHITE PAPER) in English Sep 95 pp 47-192

[White paper prepared by The Department of Communications and Energy, State Planning Commission of the People's Republic of China, September 1995]

[FBIS Transcribed Text]

Preface

Energy is an important physical basis of the national economy and the living of the people. With the reconstruction done in more than 40 years after the founding of the People's Republic, China has built an energy industrial system covering a wide range of energy on a grand scale and with a fairly rational distribution. However, the supply of energy still falls short of the needs of the socioeconomic development and the energy industry remains a bottleneck of the development of the national economy.

The Chinese government and the enterprises and organizations related to energy have made unremitting efforts to promote the development of the energy industry in China, and at the same time to strive for a coordinated development of energy, the economy and the environment in conformity with the national basic policy of environmental protection. Considerable results have been achieved so far. This White Paper gives a brief introduction of the basic conditions and achievements of the energy industry in China in 1993 and 1994. China is working on her Ninth Five-Year Plan and a plan of the national economic development up to 2010. The White Paper also presents the ideas and strategic thinking in this regard for the reference of the readers from all walks of life and invites their suggestions.

Three editions of the book *Energy Report of China* have been published which were compiled by the former Ministry of Energy. The ministry was reorganized and some of its functions were merged into the State Planning Commission in 1993. The commission is now in charge of the work of making general and specific policies on China's energy industry as well as the administrative management of the industry such as its strategy of development, yearly plan and medium-term and long-term planning. Having solicited opinions from various departments concerned, the department of Communications and Energy decided to continue the compilation of *Energy Report of China* and make it a White Paper of the government. The Department of Energy Industry of the State Planning Commission (later merged with the former Department of Communications into the present Department of Communications and Energy) thought of continuing to compile the book as early as 1993. But the compilation took a long time due to the reorganization of the departments. As the book cannot cover all the subjects in this field, shortcomings and mistakes are unavoidable for our insufficient experience and capability. Criticisms and corrections are welcome for improvement in further editions.

Great changes have taken place in energy related administrative organizations after the reorganization of the departments under the State Council in 1993. A special chapter is devoted to give a description of the macroscopic management system of the energy industries in the Chinese central government and introductions are given to some key departments. How the construction projects of energy are examined, approved and managed is a question people in energy-related circles in China and abroad are very much concerned about. In view of this, a special chapter in the White Paper is devoted to the topic for the reference of those who are concerned.

Special thanks are due to China National Offshore Oil Corporation (CNOOC) and China National Petroleum Corp. (CNPC) for their big contributions in producing this White Paper.

Table of Contents

[Following is the original Table of Contents]

Contents

Chapter 1. An Introduction of the Energy Industry

I. Summary

When New China was founded in 1949, the total output of the primary energy was a meager 24 million tons of coal equivalent (TCE). After the recovery of the economy, the figure had risen to 52 Mtce of standard coal by 1953, while the consumption of primary energy was 54 Mtce. The basis of the energy industry was very poor.

With the development of China' s socialist construction, energy industry developed speedily, a large number of key energy projects went into production one after another. By the end of the Fifth Five-Year Plan in 1980, the output and consumption of primary energy had reached 637 and 603 Mtce, respectively. Compared to that of 1953, the annual average growth rate was 9.7% and 9.3%, respectively, in the 27 years, of which the annual average growth rate between 1970 and 1980 was 7.5%.

Remarkable results have been achieved in the energy industry in China since the reform and opening to the outside world. The total output and consumption of primary energy had reached 1,039 Mtce and 987 Mtce, respectively, by 1990, and risen further to 1,188 million and 1,227 Mtce, respectively, in 1994, ranking among the first three in the world. The output of coal rose from about 32 million tons in 1949 to 1,240 million tons in 1994, ranking the first in the world; the output of crude oil rose from 120,000 tons to 146.08 million

tons, ranking sixth in the world; that of natural gas grew from almost naught in 1949 to 17 billion m^3; electricity production increased from 4.3 billion kWh to 927.8 billion kWh in 1994, ranking fourth in the world.

II. Characteristics and Achievements

1. After more than 40 years of development, the energy industry in China has formed an energy production system with coal at the dominant position mutually supplemented by various energies. In the early years after the founding of the People's Republic, the production and consumption of energy in China remained a single structure of coal which consisted of 96% of the total energy production and 94% of the total energy consumption. With a speedy development of petroleum and natural gas industry, hydropower and other energy resources, China's energy structure improved in the 1960s and a structure of energy production and consumption taking coal as the dominant and mutually supplemented by various energies was initially formed. By 1994, the proportion of coal in the production and consumption of energy had gradually dropped to around 75%, while that of oil, natural gas and hydropower (nuclear power) increased to 17.5%, 2% and 5.5%, respectively.

2. Great improvements have been achieved in the technology in China's energy industry since the founding of the People's Republic. The technological level in many fields of China's energy industry has approached or caught up with that of the developed countries. The coal industry has acquired the ability to design, build, manage and equip open-pit having a capacity at 10-million-ton-level as well as large and medium-sized mine areas. The oil industry has explored and developed the Daqing Oilfield which is at the 50-million-ton-level, has developed techniques to ensure a steady and high production in high water-bearing periods, and the capacity and technological level of crude oil processing have improved steadily. The exploration, design, construction and operation of large hydropower and thermal power stations can basically rely on domestic technological forces. The design and manufacture of hydropower plant units of 300 MW level and thermal power plant units of 600 MW are basically home-made. The domestic designed, manufactured and constructed nuclear power station of 300 MW has been put into commercial operation, efforts are being made to domestically produce plant units to nuclear power stations at a capacity of 600 MW level.

3. The construction of energy resources and new energy resources in the rural areas has seen remarkable achievements. The use of noncommercial energy equaled 230-250 Mtce and the use of commercial energy increased steadily in 1994, which enhanced the development of the economy in the rural areas and raised the living standard of the rural residents. Since the Sixth Five-Year Plan (1981-1985) and the Seventh Five-Year Plan (1986-1990), the experiment of the "Comprehensive Rural Energy Construction Project at the County Level" and the construction of "Counties with Initial Electrification in the Rural Areas" have been successfully carried out. New energy have developed and wind, solar and geothermal power have secured the improvement of economic development and living conditions in the remote and vast agricultural, pastoral and mountainous areas as well as that on islands.

4. Notable results have been achieved in energy conservation. In the 10 years from 1981 to 1990, the per unit energy consumption of the GNP in China reduced by 30%, an average annual rate of energy saving was 3.6%, and both the elastic coefficient of energy consumption and that of production elasticity dropped to 0.56. The accumulated amounts of energy saved in the 10 years was 270 Mtce, which realized the anticipated goal that the energy needed in the increase of national economy relied half on developing energy and half on energy-saving. In the first 4 years of the Eighth Five-Year Plan, the elastic coefficient of energy consumption was 0.48 and the rate of energy-saving 5.4%

5. Considerable progress has been made in the reform and opening to the outside world in the energy industry. The prices of energy products will soon leave to market regulation. The oil industry has increasingly extended external risk exploration and joint-development, the use of foreign capital in building power stations has expanded from the coastal areas to the hinterland, and experiment is actively going on in turning energy enterprises into shareholding companies or corporations. The monopoly by the state in running energy enterprises has been replaced by the policies breaking the monopoly such as, raising funds to build power stations, mobilizing ordinary people to take part in running coal mines, and encouraging cooperative development of petroleum, thus the initiative of both the local and the central governments have been brought into full play. The Electricity Construction Fund (2 cents per kWh) and special funds allocated to coal and oil exploration have provided part of stable resources to develop the energy industry. All this has injected vitality to the development of the energy industry.

III. Main Problems

In spite of the great achievements of world interest, China's energy industry falls far short of the needs of socioeconomic developments and is one of the main factors restraining a sustained development of the economy. This shows mainly in the following:

1. Though the aggregate supply of energy can basically meets the needs of economic development, the shortage of primary energy becomes gradually outstanding.

2. The structure of energy consumption with coal as the dominant and the geographically uneven distribution of energy resources cause great pressure on energy transportation and the environment. Therefore, the restraint of environmental protection and transportation capacity posed difficulties to the development of energy industry in China.

3. The management structure of the energy industry cannot meet to suit the demand of building a socialist market economic structure. Large- and medium-sized energy enterprises lack sufficient vigor and vitality.

4. A rational price mechanism of energy products has not been established. Energy enterprises are poor in fund accumulation and development on their own. Lack of funds has become one of the factors that has long perplexed the energy industry in its development.

5. The energy efficiency is fairly low and the energy intensity fairly high. On one hand, the level of energy consumption is very low, the average per capita consumption is about 20% of that in the developed countries; but on the other hand, owing to a low energy efficiency, there is a fairly large gap to the international advanced level of the energy efficiency between energy consumption of products and energy-using equipment. The waste of energy sharpened the contradiction between the supply and demand of energy.

6. A stable, reliable and economic commercial energy supply system has not been established in the vast rural areas where 80% of the Chinese population live and where nearly half of the energy consumption is noncommercial. Besides, there are 17 counties without electricity. The customary practice of taking raw materials like stalks as main energy resource in the rural areas has not only interfered with the development of rural economy and raising the farmers' quality of life but also disrupted the ecological environment.

Chapter 2. Coal Industry

I. Summary

Coal accounts for about 75% of the production and consumption of the primary energy in China and plays a decisive role in energy supply. China has abundant coal resources which have a wide distribution with a long history of mining. Coal industry has achieved great results in the 40-odd years since the founding of the People's Republic. China is now the number one coal producing country in the world. The output of coal grew from 32.43 million tons in 1949 to 1,240 million tons in 1994, an increase of 38 times. Of which the fastest development took place in the Sixth and Seventh Five-Year Plan periods with an average annual increase of 50.43 million tons and 41.40 million tons. In the first 3 years of the Eighth Five-Year Plan, the increase reduced to 22.5 million tons per year owing to the slack in the coal market. The increase rate of coal consumption picked up beginning in 1994, which sped up the production and resulted in an increase of production of 90 million tons in the same year.

Since the reform and opening to the outside world, coal mines run by townships and villages have seen a constant expansion, which now consist of one of the main forces in China's coal production and whose output has surpassed the key state-owned coal mines (formerly responsible for monopoly distribution of coal). They are the main sources of the increased output of coal in China in recent years.

Under the planned economy, the distribution structure of coal was highly planned. The commodity coal circulated in the market was basically monopoly distributed coal. The market share of monopoly distributed coal gradually reduced as commodity coal outside the state planning gradually grew with the deepening of the reform and opening to the outside world. The monopoly distributed coal is characterized by the overall planned distribution of the state, whose price is also decided by the state. Under distribution of the state, whose price is also decided by the state. Under such planned economic structure, the price of coal was irrationally fixed at a low point, which seriously restricted a sound development of the coal mines responsible for monopoly distribution (or the present state-owned key coal mines). Beginning from 1 July 1992, the state lifted price control over coal produced in two coal mines in East China (Xuzhou and Zaozhuang coal mine bureaus), Northeast China, Hunan province and Jiangxi province as well as coal for electric power generation and washed and dressed coal for metallurgical use. Except for coal produced in some places in West China, the monopoly distribution price of coal had been lifted by 1993. By 1994, the price of coal had been generally freed up (but not fully implemented everywhere), hence a drastic change took place with regard to the formation of price mechanism. Prices were set in the free market instead of fixed by the government, a big stride towards the socialist market economy. This increased the weight of market regulation in the national aggregate balance of coal.

II. Coal Resources

By the end of 1994, the total proved deposits of coal had been 1022.9 billion tons and remaining proved deposits 1001. 8 billion tons, of which mines in production and mines under construction is 192.5 billion tons, or 19.2% of the remaining proved deposits, the unused intensive explored deposits (Jingcha) amounts to 85.5

billion tons, or 8.5%; the deposits that need further exploration amounts to 723.7 billion tons, or 72.2%.

Table 1. The Nationwide Distribution of Coal Reserves (Unit: 100 Mt)

	Accumulated proved reserves	Remaining proved reserves	Reserves occupied by mines	Unused reserves
North China (excluding east Inner-Mongolia)	4,673	4,602	817	290
Northeast China (including east Inner-Mongolia)	769	728	212	186
Eastern China	577	543	244	88
South-Central China	319	290	133	38
Southwest China	860	844	173	111
Northwest China	3,031	3,031	346	143
National total	10,229	10,018	1,925	856

III. State-Owned Key Mines

The state-owned key mines refers to those large and extra-large backbone coal mines that provide China's main coal users with a steady supply of coal. They represent the advanced technology and equipment level of China's coal industry. There are altogether 104 coal mine bureaus with 614 coal mines. Among them, the largest is Datong Coal Mine Bureau with an output exceeding 30 million tons, 14 of them have an output exceeding 10 million tons, the Shenhua Group (formerly Fine Coal Corporation of Huaneng Group) engaged in coal mine development and the construction of coal shipment channel in the Shenfu-Dongsheng areas produced coal amounting to 6 million tons in 1994.

Table 2. Extra-large Coal Mine Areas With an Output of 10 Mt and More (Unit: Mt)

Name of coal mine area	in 1993	in 1994
Kai Luan	17.60	17.54
Feng Feng	10.16	10.34
Da Tong	31.75	31.52
Ping Shuo	10.32	10.50
Yang Quan	14.08	10.56
Xi Shan	14.13	15.90
Jin Cheng	10.32	10.04
Fu Xin	10.62	9.33
Tie Fa	10.00	11.05
Ji Xi	10.07	10.40
He Gang	11.30	11.55
Xu Zhou	12.62	12.79
Huai Nan	11.50	12.41

Name of coal mine area	In 1993	In 1994
Huai Bei	14.23	14.49
Yan Zhou	12.00	14.61
Ping Ding Shan	17.15	17.19

The mechanization mining of the state-owned coal mines was 71.02% in 1994, a drop of 1.12 percentage points from that of 1993, of which the fully mechanized mining 44.75%, up by 0.95 percentage points. The mechanization of digging and loading of tunneling was 74.52%, up by 3.18 percentage points from that of 1993, of which, the comprehensive digging was 10.3%, up by 0.17 percentage points.

The state-owned key coal mines fulfilled a total industrial output value of RMB 64.9 billion yuan in 1994. Their economic performances further improved in 1994 as a result of intensifying internal management, regulating industrial and product structure and raising the quality of products. Their actual deficit amounted to RMB 1.95 billion yuan, or RMB 500 million yuan less than planned deficit and a drop of RMB 1.82 billion yuan of deficit compared to that of 1993. The marketing rate of products in the state-owned key coal mines was 95.86%, the profit rate on capital and taxes 3.09%, the rate of industrial added value 46.33%, the profit/cost rate -0.02% and the turnover rate of circulation funds 1.17% times. The number of staff and workers in the state-owned coal mines totaled 3.42 million and the all-personnel labor productivity was RMB 8,608 yuan/man.

IV. Local Coal Mines

The local coal mines are divided into local state-owned and township and village collectively-owned (individually-owned) coal mines according to their ownership and management system. The local state-owned coal mines consist of mainly medium-sized and small coal mines with a certain degree of mechanization if mining. Township and village coal mines are numerous and spread wide across the country. Their mining technology and equipment are poor. The majority of them produce little and their production is done in a primitive way.

There were about 1.8 million people engaged in the local state-owned coal mines and the township and village coal mines employed about 2.1 million full-time miners plus around 3 million floating workers.

V. Production Capacity and Output

The total quantity of coal produced in 1993 was 1.15 billion tons, an increase of 35.32 million tons compared to that of 1992, or up by 3.1%. The number of 1994 reached 1.24 billion tons, increased by 90 million tons on top of 1993, or up by 7.7%.

The state-owned key coal mines produced 480 million tons of coal in 1994, up by 22 million tons that of 1993. At the same time, local state-owned coal mines produced 210 million tons of coal, up by 9 million tons and the township and village coal mines, collectively-owned and individually-owned put together, produced 520 million tons of coal, up by 28 million tons. In 1994, open out mines across the country produced 36.2 million tons of coal, or 3% of the total output. The distribution of coal output is shown in Table 3.

Table 3. Coal Output by Region (Unit: 10,000 tonnes)

	Output 1993	Ratio to the country's total (%)	Output 1994	Ratio to the country's total (%)
The Country's Total	115,132	100.0	123,990	100.0
I. Total of the three "west"	36,432	31.64	38,680	31.91
Shaanxi Province	30,656	26.63	32,543	26.85
Shaanxi Province	3,363	2.92	3,687	3.04
West Inner Mongolia	2,413	2.10	2,450	2.02
II. Total of the region of Beijing, Hebei	7,392	6.42	7,534	6.22

	Output 1993	Ratio to the country's total (%)	Output 1994	Ratio to the country's total (%)
Beijing	1,052	0.91	682	0.56
Hebei Province	6,340	5.51	6,852	5.65
III. Total of Northeast China	18,010	15.64	18,505	15.27
East Inner Mongolia	3,101	2.69	3,062	2.53
Liaoning Province	5,258	4.57	5,441	4.49
Jilin Province	2,424	2.11	2,461	2.03
Heilongjiang Province	7,227	6.28	7,541	6.22
IV. Total of East China	16,145	14.02	17,135	14.14
Jiangsu Province	2,505	2.18	2,337	1.93
Zhejiang Province	139	0.12	133	0.11
Anhui Province	3,613	3.14	3,975	3.28
Fujian Province	982	0.85	924	0.76
Jiangxi Province	2,104	1.83	2,205	1.82
Shandong Province	6,802	5.91	7,561	6.24
V. Total of South Central China	16,489	14.32	16,798	13.86
Henan Province	9,279	8.06	8,985	7.41
Hubei Province	986	0.86	972	0.80
Hunan Province	4,075	3.54	4,999	4.12
Guangdong Province	951	0.83	852	0.70
Guangxi autonomous region	1,198	1.04	990	0.82
VI. Total of Southwest China	14,864	12.91	16,594	13.69
Sichuan Province	7,934	6.89	8,970	7.40
Guizhou Province	4,529	3.93	5,053	4.17
Yunnan Province	4,401	2.09	2,571	2.12
VII. Total of Northwest China	5,800	5.04	5,956	4.91
Ningxia autonomous region	1,371	1.19	1,265	1.04
Gansu Province	1,806	1.57	1,916	1.58
Qinghai Province	231	0.20	249	0.21
Xinjian autonomous region	2,392	2.08	2,526	2.08

There were 2,337 state-owned coal mines all over the country with a production capacity of not less than 30,000 tons per year in 1994, their checked productive capacity of raw coal was 692 million tons. Among them, 614 are state-owned key coal mines with a checked productive capacity of 493 million tons and 1,723 were local state-owned with a checked productive capacity of 198 million tons of coal. Table 4 shows the distribution of coal mines shafts and their capacities.

Table 4. Distribution of Coal Mines with a Capacity of 30,000 Tonnes and More in 1994 (Unit: 10,000 tonnes)

The Country's Total	68,373	100.00
I. Total of the three "west"	20,057	29.33
Shanxi Province	16,406	23.99
Shaanxi Province	2,336	3.42
West Inner Mongolia	1,315	1.92
II. Total of the region of Beijing, Hebei	4,973	7.27
Beijing	465	0.68
Hebei Province	4,508	6.59
III. Total of Northeast China	14,156	20.70
East Inner Mongolia	2,866	4.19
Liaoning Province	4,517	6.61
Jilin Province	1,432	2.09
Heilongjiang Province	5,341	7.81
IV. Total of East China	10,865	15.89
Jiangsu Province	1,858	2.72
Zhejiang Province	167	0.24
Anhui Province	2,827	4.13
Fujian Province	579	0.85
Jiangxi Province	1,119	1.64
Shandong Province	4,315	6.31
V. Total of South Central China	8,672	12.68
Henan Province	5,688	8.32
Hubei Province	330	0.48
Hunan Province	1,544	2.26
Guangdong Province	412	0.60
Guangxi autonomous region	698	1.02
VI. Total of Southwest China	6,215	9.09
Sichuan Province	3,780	5.53
Guizhou Province	1,343	1.96
Yunnan Province	1,092	1.60
VII. Total of Northwest China	3,435	5.02
Ningxia autonomous region	1,150	1.68
Gansu Province	1,131	1.65
Qinghai Province	258	0.38
Xinjian autonomous region	896	1.31

VI. The Coal Preparation

In 1994, 23.15% of raw coal was washed, of which 49% for state-owned key coal mines and 19% for local state-owned coal mines, there is basically no wash with township and village collectively and individually-owned coal mines.

The output of washed and dressed coal for coking coal was 77.73% million tons in 1994, of which 71.72 million tons was for metallurgical use.

In 1994, there were 123 coking coal wash plants in state-owned key coal mines in China with a capacity of coal wash of 170 million tons; there were 80 thermal coal wash plants with a capacity of coal wash of 117 million tons. Local state-owned coal mines have 176 coal wash plants with a coal wash capacity of 48.86 million tons.

VII. The Construction of Coal Mines

In 1993 and 1994, the infrastructural construction investment in coal industry amounted to RMB 16 billion yuan and RMB 17 billion yuan, respectively. The aggregate size of the infrastructural construction in the coal industry was 147 million tons, of which, 18.6 million tons belonged to the newly started projects and that went into operation amounted to 14 million tons. The newly started projects in 1994 mainly included The No. 3 Dayan coal mine in the Dayan coal mine areas in Inner Mongolia, with a designed capacity of 3 million tons/year; the Shaqu coal mine in the Liliu coal mine area in Shanxi province, with a designed capacity of million tons/year [as published]; the Zhangji coal mine in the Huainan coal mine area in Anhui province, with a designed capacity of 4 million tons/year; and the Huojitu coal mine in Shenfu-Dongsheng coal mine area of Huaneng Fine Coal Company, with a designed capacity of 5 million tons/year.

VIII. The Early Stage Work of Large- and Medium-Sized Coal Projects

The state approved project proposals in 1994 included the Pingshuo Coal Mine Area with a size of 45 million tons/year; the Anjialing Open-pit in the Pingshuohengli Coal Mine Area in Inner Mongolia with a size of 10 million tons/year.

The feasibility study reports approved by the state in 1994 included the Wangjialing coal mine in the Xiangning coal mine area, Shanxi Province, with a size of 6 million tons/year.

IX. The Foreign Trade in Coal

The exportation of coal from China in 1994 amounted to 24.5 million tons, 4.5 million tons more than that in 1993, up by 22.5%. Japan is the country that had the largest share of China's exported coal, 37%; and the next was the Republic of Korea, 27%. The supply to Chinese regions, Taiwan accounted for 16% and Hong Kong 6%. Thermal coal was the main product for export, accounting for 75% of the exported coal, and the next was coking coal, accounting for 15%.

The importation of coal to China in 1994 amounted to 2 million tons, mainly used as fuel by thermal power stations in the coastal areas in East China and a small part as coking coal for metallurgical use.

X. Major Problems in Coal Industry

1. The state-owned coal mines are over-staffed and operate with low efficiency, hence lack of competitiveness. As most of Chinese coal mine areas are situated far away from cities with few social and public facilities, the coal enterprises are compelled to run as small self-contained society. Coupled with poor ideas on efficiency and economic performances, most coal enterprises have landed in a very difficult situation.

2. The internal industrial structure and product structure are irrational. The work division among industries under the planned economic structure restricted the coal industry to just mining coal. Besides producing some building materials to meet the needs of coal production and construction, other industries are generally not developed in the coal sector, thus a single structure was formed with both the industry and its products. In recent years coal enterprises have achieved good results in shifting to other production and in going in for a diversified economy. However, the starting point of diversified economy for non-coal businesses was low and small in size as a result of the lack of overall planning and matched policies. The majority of the non-coal businesses were set up for labor replacement purposes; few of them have formed an economic scale and reaped good economic results.

3. The qualification of the local coal mines is poor as a whole. The input into the local state-owned coal mines is insufficient at present; their output fluctuates around 200 million tons. The total number of township and village collectively-owned and individually-owned coal mines is more than 80,000. Most shafts are small with backward technical equipment and mining methods. Their rate of resource recovery is low with serious waste. Particularly those small mines that indiscriminately dig and mine excessively within the areas of large mines (state-owned key mines) and vie with the large mines for coal resources have threatened the safety of the large mines.

4. Owing to fund shortage in coal mine enterprises, their tunneling footage dropped in recent years. Since it is

hard to sustain production, some shafts have shown an imbalance in excavation and coal-winning.

5. Only a few infrastructural constructions put into operation in China's large and medium-sized coal mines in the past successive Five-Year Plans, falling short to suit the rapid expansion of the size of coal production, which will have a negative impact on later development of the coal industry.

Chapter 3. Electric Power Industry

I. Summary

China's electric power industry remained very backward in the early years after the founding of the People's Republic. The output of electricity totaled about 43 billion kWh, of which 84% was hydropower and 16% thermal power. Thanks to the development in the 40-odd years, the output of electricity in 1993 reached 836.4 billion kWh, an increase of 194 times at an average annual increase rate of 12.7%. Fundamental changes have taken place in the composition of power, too. Thermal power took 74.4% and 80.5% in the national installed capacity of power generation and the total electricity output respectively.

The electric power industry of China has maintained a momentum of rapid development in recent years. The national installed generation capacity aggregated 182.9 GW in 1993, an increase of 9.9% over that of 1992. Of which, hydropower took 44.6 GW, thermal power 138.3 GW. The total electricity output in 1993 was 836.4 TWh, up by 10.9% over that of 1992. Of which hydro power took 150.7 TWh and thermal power 685.7 TWh.

By the end of 1994, the national installed generation capacity had reached 199.9 GW; of which 49.1 GW, or 24.5%, was hydro power, 148.7 GW, or 74.4%, was thermal and 2.1 GW, or 0.7%, was nuclear. The total installed capacity grew by 9.3% from that of 1993. The total electricity generation was 927.8 TWh, of which 166.8 TWh was hydro power, 747.1 TWh was thermal and 13.9 TWh was nuclear. The total power generation was 10.9% more than that in 1993. The total utilization hour of generation equipment was 5,233 hours, of which 3,877 hour were for hydropower and 5,574 hours for thermal power.

Eight power networks had an installed capacity over 10 GW in 1994, they were the power networks in North China, Northeast China, East China, Shandong, Central China, Guangdong, Sichuan and Northwest China. Among them, the installed capacity of East China power network, the largest, had reached 36.1 GW. The installed capacity and the electricity generation of the eight networks consisted of 88.1% and 89.7%, respectively, of their national total.

The state approved the establishment of five large power group corporations in 1993, namely that of North China, Northeast China, East China, Central China and Northwest China, and they are independent units for allocation and distribution of materials and funds under state planning. With 10 years development and by using foreign investment, the Huaneng International Power Development Corporation has built an installed capacity 6,440 MW and another 1,800 MW is under construction.

By the end of 1994, there were 34 power plants with an installed capacity over GW [as published], among them seven hydropower stations, 26 thermal power plants and one nuclear power plant. The largest hydropower plant is Gezhouba (2,715 MW), the largest thermal power plant is Douhe (1,850 MW), and the largest nuclear power plant is Dayabay (1,800 MW). The total electricity consumption in 1994 was 904.6 TWh, of which 9.7% was for the daily life of the urban and rural people, 16.3% for agriculture and animal husbandry, 75.5% for industry, 1.8% for transportation and 1.8% for commerce. The per capita electricity consumption for the people's livelihood was 73 KWH.

II. Power Construction

The newly commissioned generation capacity in 1994 was 17.0 GW, of which hydropower accounted for 4.5 GW, thermal power 10.4 GW, and nuclear power 2.1 GW. The total newly increased power generation in large and medium-sized power plants amounted to 13.7 GW, of which 3.7 GW was hydropower, 7.9 GW thermal power, and 2.1 GW nuclear power. Hydropower of 3 GW went into production with a single plant unit of 100 MW and above, of which the largest newly increased single unit capacity was 302.5 MW. Thermal power of 6.3 GW went into production with single plant unit of 100 MW and above, of which the largest newly increased thermal single unit capacity was 600 MW. Added to nuclear power was a 300 MW plant unit at Qingshan nuclear power station and two plant units of 900 MW at Dayabay nuclear station.

An investment of RMB 72.6 billion yuan will be fulfilled this year, of which the input of the central government amounts to RMB 28.39 billion yuan, local government RMB 33.26 billion yuan and foreign investment converted into RMB 8.34 billion yuan.

In 1994, the newly started projects approved by state amounted to 6,180 MW, of which 1,480 MW was hydropower and 4,700 MW was thermal power.

III. Hydropower

China has abundant waterpower resources which can be developed into an installed capacity of 378 GW with an electric power generation of 1,980 TWh ranking first in the world. However, the waterpower resources are unevenly distributed, which is characterized by abundance in the west and scarcity in the east (that in Sichuan, Yunnan, Tibet and Guizhou takes 67.8% of the country's total, of which Sichuan, Yunnan and Guizhou Provinces takes more than 50% of the country's total); the Yangtze River takes 53.4% of the country's total, the Yaluzangbu River and other rivers in Tibet 15.4%, and rivers in southwest China neighboring countries 10.9%.

The construction of hydropower has made great achievements since the founding of the People's Republic. The hydroelectric power generation in 1994 was 170 TWh, or 17.8% of that of the country's total. The hydropower installed capacity and the electricity output ranked No. 6 and No. 8 in the world, respectively, instead of ranking No. 20 and No. 21 before. However, the present utilization of waterpower resources is but less than 9% calculated based on electricity generation, far below the average level of development in the world and there is great potential in the future.

By the end of 1994, China had built seven extra-large hydropower stations with an installed capacity over 1 GW, their total installed capacity was 11.567 GW (that of Gezhouba 2.715 GW, Liujiaxia 1.225 GW, Baishan 1.5 GW, Longyangxia 1.28 GW, Geheyan 1.212 GW, Manwan 1 GW, and the pumped-storage power station in Guangzhou 1.2 million kilowatts). There are another 28 large hydropower stations in China with a capacity between 0.25 to 1 GW. Their installed capacity totaled 14.5 GW. In the 45 years since the founding of New China, the hydroelectricity generation put together amounted to 2,113.1 TWh, equivalent to a substitution of 870 TCE (calculated based on the average standard consumption of coal for electric generating 412 g/kWh).

At present, 23 hydropower stations with a capacity over 100 MW are under construction (including projects partly put into production), their total capacity being 40.46 GW. Among them, 13 power stations of a capacity over 1 GW which have a total capacity of 35.96 GW (that of the Three Gorges 18.2 GW, Ertan 3.3 GW, Lijiaxia 1.6 GW, Xiaolangdi 1.56 GW, Wanjiazhai 1.08 GW, Manwan 1.5 GW, Yantan 1.2 GW, Shuikou 1.4 GW, Geheyan 1.2 GW, Wuqiangxi 1.2 GW, and the second phase of the pumped-storage station in Guangzhou 1.2 GW).

Two approved projects started construction in 1994, totaling 2.08 GW (1.8 GW of the Tianhuangping pumped storage station and 0.28 GW of the third phase of Fengman project). By the end of 1994, three projects with feasibility study reports approved and waiting for the approval of starting construction had a total capacity of 5.79 GW (4.2 GW of Longtan, 1.35 GW of Dachaoshan and 0.24 GW of Lingjintan). Another three projects with project proposals approved and waiting for the approval of their feasibility study reports had a total capacity of 1.394 GW (0.54 GW of Hongjiadu, 0.6 GW of Mianhyatan and 0.254 GW of Gaobazhou).

IV. Thermal Power

Thermal power plays the leading role in China's power industry and it is basically coal-fired power stations. The installed capacity of thermal power grew very quickly in recent years with a yearly increased installed capacity over 10 GW. As the newly increased capacity was fairly large, the aggregate technical and equipment level of thermal power generation rose quickly, too. By the end of 1994, the total capacity of generator units between 300 MW and 600 MW had reached 25.8% of the total installed capacity of thermal power, a rise of 9 percentage points over that of 1990. At the same time, the state took measures to replace small thermal power generators of low pressure, high energy consumption, low efficiency and heavily polluting with large generators and made technical innovation (including a combined supply of both heat and electricity). It is planned that such small generator units will be eliminated before the year 2000. The capacity of this kind of small generator units totals 20 GW at present.

The total fuel consumption in 1994 was 282 Mtce, of which 92.2% was coal, 6% was oil and 0.9% was natural gas. The coal consumption of thermal power was 381 gce/kWh and coal consumption of power supply was 414 gce/kWh. The rate of electricity use by the power plants themselves was 6.9% and the rate of wire loss was 8.73%.

China has abundant resources of coal. However, it is concentrated in the region of "three west," namely, Shanxi, Shaanxi and the west Inner Mongolia. The construction of new thermal power plants is restricted by the sources and transportation of coal. The state, while examining and giving approval of large projects of power stations, encourages investors to put up power stations near coal mines where electricity will be transmitted to the developed regions in East China and to build a number of power stations near harbors and intersections of roads so that they can take advantage of good transportation facilities along the coast, or river banks, or railway.

Great progress was achieved in promoting the building of inter-provincial thermal power stations on the basis

of cooperation. The state has approved the proposal of project of Toketo Power Plant in Inner Mongolia designed to supply power to Beijing, Tianjin and Tangshan, and Tongliao Power Plant in East Inner Mongolia to supply power to the power network in Northeast China. There is also progress in the early stage work of building Qujing Power Plant in Yunnan to supply Guangdong with power and Yangcheng Power Station in Shanxi to supply power to Jiangsu. The early stage work on building Wangqu Power Station in Shanxi designed to supply Shandong with electric power has also commenced.

V. Nuclear Power

By the end of 1994, the installed capacity of nuclear power was 2100 MW, amounting to 1.1% of the total installed capacity through the country, the electricity generation in 1994 was 14 TGW, or 1.5% of the country's total electricity output in the same year.

(1) Three nuclear generator units went into operation with a total capacity of 2100 MW.

The First Phase of Qingshan Nuclear Power Station: It is the first nuclear power station of pressurized water reactor designed, built and debugged by China, having an installed capacity of 300 MW. It was interconnected and began to generate power on 15 February 1991 and went into commercial operation on 1 April 1994. Its electricity output in 1994 was 1.77 TWh.

Daya Bay Nuclear Power Station: It has an installed capacity of 2 x 900 MW. The complete set of its equipment was imported from (famatong) and GEC (alstone) corporation. The No. 1 and No. 2 generators went into commercial operation on 1 February and 6 May 1994, respectively. Its electricity output in 1994 was 12.26 TWh. It had supplied Hong Kong with 7.8 TWh or 64% of its power supply at that time. The going into operation of the two nuclear power stations marked that the Chinese undertakings of nuclear power had proceeded from starting phase to a development phase.

(2) Preparation for starting the second phase construction of Qingshan Nuclear Power Station was finished in 1994. The scope of the construction was 2 x 600 MW. It is planned to put it into operation in the year 2001. The equipment shall be domestically made with some key spare parts imported from abroad.

(3) Two project proposals had obtained approval in 1994 with a total capacity of 4000 MW.

The No. 2 Guangdong Nuclear Power Station: 2x1000 MW, it is planned to use French loan and equipment and the relevant agreement has been signed. It is expected to put into operation in the year 2002.

Liaoning Nuclear Power Station: 2x1000 MW, it is located at Wafangdian. The Chinese government signed an agreement with the Russian government to construct the power station with loan from the Russian government and use Russian equipment. Both the Russian and Chinese parties are preparing their feasibility study. Negotiations on the loan and the import of equipment will begin before long.

(4) Projects with early stage work under way account for a total capacity of more than 10 GW. Provinces including Zhejiang, Jiangsu, Fujian and Shandong have requested to build nuclear power stations and they have actively begun the early stage work.

VI. Power Networks

There are all together 15 independent large regional and provincial power networks. Besides the eight networks each with a capacity over 10GW mentioned above, there are seven more provincial networks including that of Fujian, Guangxi, Hainan, Guizhou, Yunnan, Tibet and Xinjiang.

In 1994, the length of power transmission lines of over 35 KV totaled 599,414 km with a capacity of transformer equipment totaling 565.8 GVA; of which the length of lines with 500 KV totaled, 11,197 km with a capacity of transformer equipment of 38.7 GVA; the length of 330 kV lines totaled, 4,924 km with a capacity of transformer equipment of 8.0 GVA; the length of 220 kV lines was 91,216 km with a capacity of transformer equipment of 161.8 GVA; and the length of 110 kV lines totaled 142,473 km with a capacity of transformer equipment of 198.7 GVA.

The four large networks in North China, Northeast China, East China and Central China all have formed their trunk network frame of 500 KV while 330 KV network has been built in Northwest.

Guangxi and Guizhou have connected Guangdong by a 500 KV primary circuit, forming a jointly run South China network. Yunnan provincial network also linked to it by a line of 220 KV.

China has the 500 kv primary circuit of direct current power transmission and transformer project from Gezhouba to Shanghai. Approval has been obtained from the state for the construction of the circuit of direct current power transmission project (from Tianshengqiao to Guangdong).

VII. Introducing Foreign Investment

The introduction of foreign investment into the electric power industry has made headway. Besides indirectly introducing foreign investment, the way of using foreign investment has diversified. The typical forms are as follows:

1. There are two ways to capitalize the retained assets. One is to sell part of the retained assets, turning the enterprise under Chinese management and operation into a joint venture; and the Chinese party will use the income from the sale to put up new power projects, for example, Xinxiang Power Plant, Henan Province, adopted this way. The other is to come into joint venture with foreign investors with its retained assets as investment contribution for the joint operation of the existing power plant and the building of the new one. This was the way Jinzhou Power Plant took, whereas the Chinese party contributed all the existing assets of the power plant as its investment and the foreign party made its investment in cash, then the joint venture used the fund in cash to build new power plant to make up for the lack of power construction funds in China.

2. Joint venture. After the capital input by both the Chinese and foreign parties, construction funds will be raised by financing of share capital or of projects, which is a way frequently used in introducing foreign investment such as power plants in Zhuhai of Guangdong Province, Yangcheng of Shanxi Province and Jiaxing of Zhejiang Province.

3. The successful listing of Shandong Huaneng Power Generation Corporation, and Huanong International Power Co. Ltd. in the stock market in the United States has further broadened the channel of introducing foreign investment, which is an encouraging step to push Chinese enterprises to the world market.

VIII. Early Stage Work

In 1993, 36 feasibility study reports on power plant projects with a total capacity of 18.31 GW had gained approval of the state, of which, seven projects were hydropower with a total capacity of 6.03 GW and 29 projects of thermal power with a total capacity of 12.28 GW. Meanwhile, 44 proposals of project were approved with a total capacity of 32.12 GW, of which six projects were hydropower with a total capacity of 2.1 GW and 38 projects of thermal power with a total capacity of 30.02 GW. (See Table 5)

Table 5. State Approved Reports on Feasibility Study and Proposals of Power Project in 1993

Feasibility study report approved projects			Proposal approved projects		
Projects	Capacity (MW)	Remarks	Projects	Capacity (MW)	Remarks
Total	18,311.8			32,124	
1. HYDROPOWER					
Xianghongdian pumped-storage	2x40		Mianhuatan, Fujian	4x150	Foreign funds
Changdian, Hubei	3x10		Linjiatan, Hunan	8x30	Foreign funds
Zhaishui, Hunan	4x17		Bailongtan, Guangxi	6x32	
Guangdong pumped-storage	4x300	Foreign funds	Nanyahe ph - 1, Sichuan	2x120 + 3x44	
Longtan, Guangxi	7x600	Foreign funds	Hongjiadu, Guizhou	3x180	Foreign funds
Tianshengqiao-2	2x220		Ni'na, Qinghai	160	
Chalong, Tibet	4x2.7				
2. THERMAL POWER					
Songyu, Fujian	2x300	Sino-HK joint venture	Ligang Phase-2, Jiangsu	2x350	Foreign funds

Feasibility study report approved projects			Proposal approved projects		
Projects	Capacity (MW)	Remarks	Projects	Capacity (MW)	Remarks
Meizhouwan, Fujian	2x300 (2x350)	Solely foreign-owned	Zhangjiagang (expansion), Jiangsu	2x125	
Taizhou (exp.), Zhejiang	1x300		Taizhou (exp.), Zhejiang	1x300	
Laohe phase-2, Anhui	2x300		Wangjiangmen cogeneration, Zhejiang	2x50	Foreign funds
Zhangping ph.-2, Fujian	1x100		Wuhu phase-4, Anhui	2x125	
Fengcheng, Jiangxi	4x300		No. 2 Hefei, Anhui	2x300	
Shiheng, Shandong	1x300		No. 2 Huaibei, Anhui	2x300	Sino-foreign joint venture
Zhangdiao cog., Shandong	1x50 + 1x25		Jianggangshan, Jiangxi	2x300	
Yaomeng ph.-4, Henan	2x300		Fengcheng, Jiangxi	4x300	
Luoyang cog., Henan	2x142		Laicheng, Shangdong	4x300	
Yahekou, Henan	2x350	Foreign funds	Rizhao, Shangdong	2x300	
Anyang, Henan	1x300		Heze phase-2, Shangdong	2x300	
Nan'ao wind power field, Guangdong	6		Anyang (exp.), Henan	1x300	
Qujing, Yunnan	2x300		Hebi phase-2, Henan	2x300	
Gaobeidian cog., Beijing	2x140 + 2x185	Foreign funds	Yongcheng, Henan	2x300	
Shijingshan cog. ph.-2, Beijing	1x200		Xinyang (exp.), Henan	2x300	
Yangliuqing, Tianjin	2x300	Foreign funds	Hanchuan ph.-2, Hubei	2x300	
Sanhe, Hebei	2x300	Foreign funds	Yangluo ph.-2, Hubei	2x300	
Qinhuangdao phase-2, Hebei	2x300		Shanwei, Guangdong	2x600 + 2x600	Sino-foreign joint venture
Shang'an ph.-2, Hebei	2x300		Taishan, Guangdong	2x660 + 2x600	Foreign funds
Hengshui, Hebei	2x300		Mawan phase-2, Guangdong	4x300	
Dalate Phase-2, Inner Mongolia	2x330	Foreign funds	Beihai, Guangxi	2x300	Sino-HK joint venture
Haibowan, Inner Mongolia	2x100		Shalingzi ph.-2, Hebei	2x600	
Fengzhen Phase-2, Inner Mongolia	2x200		Hanfeng, Hebei	4x300	

Feasibility study report approved projects			Proposal approved projects		
Projects	Capacity (MW)	Remarks	Projects	Capacity (MW)	Remarks
Zhurihe wind power field, Inner Mongolia	10		No. 1 Taiyuan cog. ph.-6, Shanxi	2x300 + 2x25	
Hunchun ph.2-, Jilin	2x300		Hequ, Shanxi	4x300	
Mudanjiang phase-3, Heilongjiang	2x200		Dalate Phase-2, Inner Mongolia	2x300	Foreign funds
Qitaihe, Heilongjiang	2x300	Foreign funds	No. 1 Yangcheng, Shanxi	6x350	Foreign funds
Hongyanchi phase-4, Xinjiang	1x200		Tongliao phase-3, Inner Mongolia	2x300	
			Fengzhen Phase-2, Inner Mongolia	2x200	
			No. 2 Changchun cog., Jilin	2x300	
			Shuangyashan phase-3, Heilongjiang	2x600	
			No. 2 Hancheng, Shaanxi	4x300	
			Pingliang, Gansu	4x300	
			Xigu Cog. (rebuilding), Gansu	1x140	
			Liancheng ph.-2, Gansu	2x200	
			No. 2 Hami phase-2, Xinjiang	2x25	
			Four wind power fields, Xingjiang, etc.	30	

In 1994, 11 feasibility study reports on projects of power construction were approved by the state with a total capacity of 5.32 GW, of which four projects of hydropower with a total capacity of 1.82 GW and seven projects of thermal power with a total capacity of 3.5 GW. At the same time, 21 proposals of project were approved with a total capacity of 19.63 GW, which were all thermal power projects. (See Table 6)

Table 6. State Approved Reports on Feasibility Study and Proposals of Power Project in 1994

Feasibility study report approved projects			Proposal approved projects		
Projects	Capacity (MW)	Remarks	Projects	Capacity (MW)	Remarks
Total	5,325			19,630	
1. HYDROPOWER					
Fengman (exp.), Jilin	2x140				
Shiquan (exp.), Shaanxi	2x45				
Manwan (exp.), Yunnan	1x105				

Feasibility study report approved projects			Proposal approved projects		
Projects	Capacity (MW)	Remarks	Projects	Capacity (MW)	Remarks
Dachaoshan, Yunnan	6x225				
2. THERMAL POWER					
Tongliao phase-3, Inner Mongolia	2x300		Tuoketuo, Inner Mongolia	2x600	Foreign funds
No. 2 Yangzhou, Jiangsu	2x600	Foreign funds	Zhangze ph.-3, Shanxi	2x300	
Wangjiangmen cogeneration, Zhejiang	2x50	Foreign funds	Tieling ph.-2, Liaoning	2x600	
Hebei phase-2, Henan	2x300		No.2 Hongyanchi phase-1	4x200	
Qingshan (retrofit), Hubei	2x100		Wujing ph.-8, Shanghai	2x600	Foreign funds
Yangluo phase-2, Hubei	2x300		Nantong ph.-2 (Huaneng), Jiangsu	2x350	Foreign funds
Yangzonghai (retrofit), Yunnan	1x200		Jiaxing ph.-2, Zhejing	4x600	Foreign funds
			Beilungang (No. 5 unit), Zhejiang	1x600	Foreign funds
			Chizhou, Anhui	2x300	
			Puzhou ph.-2 (Huaneng), Pujian	2x350	Foreign funds
			Shengli oil field ph.-2, Shandong	2x300	
			Liaocheng, Shandong	2x600	Foreign funds
			Dezhou ph.-3 (Huaneng), Shandong	2x600	
			Weihai ph.-2 (Huaneng), Shandong	2x300	
			Huanggang, Hubei	2x600	Foreign funds
			Wangcheng, Hunan	2x300	
			Yueyang ph.-2 (Huaneng), Hunan	2x350	Foreign funds
			East Shenzhen, Guangdong	4x660	Foreign funds
			Haikou ph.-3, Hainan	2x125	
			Zhabei (retrofit), Shanghai	4x100	
			Handan cogeneration (ret.), Hebei	2x120	

IX. Major Problems

The shortage of electricity has not fundamentally been filled up. With the continuous rapid growth of the national economy and steady improvement of the people's living conditions, the demand on electricity has kept a momentum of drastic increase. Meanwhile major changes have taken place in the structure of electricity consumption and the gap between peak and valley has been widening. As the development of the electric power industry falls behind the growth of the demand of electricity, turning off or restricting the use of electricity often occurred all over the country, which has become an outstanding problem in some places. The contradiction of peak supply capacity shortage of electric networks has sharpened.

The situation for capital funds to be put in place improved a lot in 1994 than that in the previous year. However, the putting in place of local funds failed to be in time, thus shortage of funds remained an outstanding problem. As the capacity of newly started projects in 1993 and 1994 did not reach a reasonable size, the total scale of electricity construction fell. Driven by the demand, small thermal generator units developed fast in an irrational way.

The construction of electric network lags relatively behind that of electric sources. As the input in the construction of electric networks is insufficient. the proportion of the construction of electric networks to that of electric sources is not rational enough. The poor electric network structure, the backward electric networks in both urban and rural areas as well as the distribution of electricity cannot bring into line with supply, all these have worked to sharpen the shortage of electricity. Though charge for electricity supply construction has raised, the increased fee cannot offset price rises owing to the failure of resolving a lot of old problems As a result, the " bottleneck" of the urban electric networks is all the more outstanding.

The rise of fuel prices and the payment in arrears of electricity charges have a negative impact on the production and operation of electric power.

Chapter 4. Oil and Natural Gas Industry

I. Summary

China has rich resources of oil and natural gas. According to an assessment made in 1993, the resources of oil totaled 88.8 billion tons and that of natural gas 39,000 billion m^3. The deposits of oil and natural gas that have been proven consist of about 20% and 3% of their total, respectively. The geographical distribution of these resources is very uneven, and the degree of exploration varies greatly and there is great potential in exploration. The resources of oil mainly concentrate in Northeast and Northwest China and the Bohai Bay area, and the deposit of natural gas mainly concentrates in the central Sichuan basin, the basins in Shaanxi, Gansu and Ningxia and Talimu basin in West China. Offshore natural gas mainly concentrates in the South China Sea and East China Sea.

The basis of China's oil industry was very poor at the time of the founding of the People's Republic in 1949. The output of crude oil was 120,000 tons in 1949, and that of natural gas 10 million m^3. With the discovery of the oil fields in Kelamayi and Daqing in the 1950s, the deposit and output of oil increased quickly and China became basically self-supporting of oil in 1965, thus the situation that China relied on oil imported from abroad changed. In the 1960s, several oil fields were discovered around Bohai Bay, the output of crude oil in China had broken the record of 100 Mt in 1978, hence China has ranked among the major oil producing countries in the world. In 1994, China's output of crude oil amounted to 146.07 Mt, ranking the fifth in the world and that of natural gas 17 million m^3, ranking 24th in the world.

Now 25 oil and natural gas producing bases have formed including Daqing, Shengli and Liaohe oil fields (21 on the land and four in the offshore areas). By the end of 1994, 323 oil fields had been put into operation with a crude oil producing capacity of 143.25 Mt and a capacity of natural gas production of 12.6 million m^3. By 1994, 18,000 km of oil pipelines had been laid through the whole country and formed a network in Northeast, North and East China, as well as a natural gas pipeline network in Sichuan. The carrying quantity of oil pipelines directly from oil wells now is equivalent to two-thirds of the total crude oil transported in the whole country .

Since the reform and opening to the outside world, China has imported large numbers of advanced technologies and equipment from abroad ranging from exploration, exploitation, surface engineering construction to oil equipment manufacture, which greatly raised China's level of oil exploration and exploitation. China has basically reached or approached the advanced level in regard to the theory of oil geology, exploration, techniques, development of oil fields, and large numbers of oil professionals and managers have been trained as well.

II. The exploration of Oil and Natural Gas Resources in 1994

China achieved good results in the exploration of oil and natural gas resources in 1994, which is a year when

larger amounts of deposits were proven compared with the past years. This laid a foundation for a sustained and steady development of the oil industry in China. The major exploration results are as follows:

1. The basin of Songliao: (1) Toutai Oilfield with a deposit at the level of 100 Mt has been proven. The oilfield is situated to the east of Changyuan, Daqing and western section of Chaoyanggou terrace. The area that is verified for oil deposit covers an area of 190 km² with more than 100 Mt of oil deposit. (2) Da'an Oilfield is proven, which is situated to south of the Songliao Basin with a verified area of oil deposit covering more than 130 km² and a deposit of oil of over 6 Mt. (3) Xinzhan Oilfield was discovered, which is situated to the north of the Songliao Basin and west of Changyuan, Daqing and the explored area covers more than 300 km². It is estimated that the geological oil deposit will surpass 100 Mt.

2. Important progress was made in the oil and natural gas exploration around the Bohai Bay offshore zones: (1) New progress was seen in the geological structural belt on the Taiyang (Sun) Island and Kuihua (Sunflower) Island of the Liaohe offshore zone. The whole structural belt covers an area of 300 km². There is the growth of five oil-bearing traps including the Taiyang Island, Kuihua Island and Longwangmiao (Dragon King Temple). Six wells with industrial oil and gas flow have been discovered on the Taiyang Island and Kuihua Island structure. It is initially proved that there is a fairly large size of oil geological deposit, showing promising prospects. (2) A breakthrough was achieved in the exploration in the Zhangdong area of Dagang offshore zone and high yielding wells of oil and natural gas flow have been acquired. It is initially verified that the oil geological deposit is more than 20 Mt. (3) High yielding oil and gas flows have been discovered in all the three exploration wells north of the Shengli-Chengdao Oilfield. It is initially verified that the Shenghai area is a draping anticlinal fault oilfield with a multilayered oil-containing system covering a large area. The estimated future deposit surpasses 100 Mt.

3. Major discovery was made again in West China: (1) New discovery and progress was made in he Talimu Basin. Yaha oil and gas field was verified, showing promising exploration prospects in the basin. (2) Breakthrough and progress was made in the central region and on the northwest border of the Zhunger Basin and oil geological deposit of a certain size has been verified. (3) Major breakthrough was achieved in the risk exploration in the Yanqi Basin and for the first time, an industrial oil and gas flow was found in the No. 1 Yansheng well on the Baolangsumu structural belt.

4. Major discovery in the exploration of natural gas in the Sichuan Basin: (1) A large gas-containing structural belt was discovered in Wenquanjing-Huanglongchang. Industrial and high yielding wells of natural gas flow have been acquired. Hopefully the Wenquan area will turn out to be a belt with richly concentrated natural gas, according to estimate. (2) There was new discovery in the Datianchi-Mingyuexia structural belt in east Sichuan, where industrial natural gas flow wells were found. This structural belt will probably form a richly concentrated belt of natural gas. (3) The three structural belts of Shaguanping, Tanmuchang and Xinglongchang have been integrated into one area, forming a fairly large gas-containing area.

(5) It is verified that the East 1-1 structure is a large offshore natural gas field: The East 1-1 structure is situated in the west of the South China Sea. After 3 years exploration, it has been verified that it is a large natural gas field with a deposit of over 60 billion m³ which is the No. 2 largest gas field in China next only to Ya 13-1 Gas Field. Its discovery predicts promising exploration and exploitation prospects in the large gas area in the west of the South China Sea.

III. Production of Oil and Natural Gas in 1994

The output of crude oil in China further increased in 1994, amounting to 146.08 Mt, up by 1.4% over that of 1993. The output mainly was from the east of China while that from the west and offshore took a smaller proportion. And in the east of China, the output of crude oil of Daqing, Shengli and Liaohe Oil Fields took the bulk, their output consisted of 70% of the total output of crude oil of the whole country.

Daqing is the largest oil field in China, which was discovered in September 1959 and went into operation in the early 1960s. It has 14 oil and natural gas fields of varying sizes. In the 30-odd years, Daqing Oil Field has formed a complete production capacity including exploitation of oil and gas, gathering and conveying, handling, processing, and transporting to other places. Its output of crude oil has been stabilized at the level of 50 Mt and its overall development has entered the rank of the advanced level in the world. In 1994, the output of Daqing Oil field totaled 56 Mt, about 40% of the country's total.

Shengli Oil Field, China's second largest oil field, whose first high yielding oil well was successfully drilled in September 1962. After 30-odd years exploration, more than 60 oil and gas fields of different types have been successively found and new discoveries were continuously reported. The output of crude oil in Shengli Oil field has reached 30 Mt. It produced 30.90 Mt of crude oil in 1994, or about 21% of the country's total.

Liaohe Oil Field is the third largest oil field in China. After a systematic exploration and exploitation of 20-odd years, more than 20 oil and gas fields of different types and sizes have been built and put into production with a total production capacity of 15 Mt and it produced 15.02 Mt of crude oil in 1994. Of its crude oil there are conventional oil, thick oil and high solidification point oil, and condense oil takes a considerably large share of its total production.

The output of natural gas in China in 1994 was 17 billion m^3, basically the same as that in 1993. Sichuan is China's largest production base of natural gas, whose output of natural gas amounted to 7 billion m^3 in 1994, or about 43% of the national total. Daqing ranks No. 2 with an output of 2.3 billion m^3 in 1994 and Liaohe, the No. 3 with an output of 1.8 billion m^3 in 1994.

IV. Supply and Demand of Oil and Natural Gas

In 1994, China produced crude oil of 146.08 Mt, exported 18.49 Mt of crude oil, imported 12.35 Mt of crude oil, exported oil products of 4.39 Mt and imported oil products of 13.90 Mt. The consumption of oil amounted to 149.56 Mt. The stock of both crude oil and oil products was somewhat increased.

In 1994, the supply of natural gas fell short in the east of China while associated gas was discharged from the oil field into the air in the west, Talimu and Tuha Oil Fields in particular. It is imperative to study the problem of how to make use of natural gas. Chinese oil fields sold natural gas amounting to 10.2 billion m^3, of which, 6.2 billion m^3, or 60.8%, was used to produce chemical fertilizer; 2.4 billion m^3, or 23.5%, used for fuel and 1.6 billion m^3, or 14. 7%, for urban residential use. The output of natural gas will not increase much in 1995 while the demand of gas increases rapidly. The contradiction in domestic demand and supply is sharp.

V. Cooperation With Foreign Countries

1. Inviting Foreign Bids

The State Council of China promulgated "Regulations of the People's Republic of China on the Exploitation of Offshore Petroleum Resources in Cooperation with Foreign Enterprises" in 1982 and it is stipulated that China National Offshore Oil Corporation (CNOOC) will be in charge of the overall businesses in the cooperative exploitation of offshore petroleum resources, or termed as "one window handling foreign business." CNOOC enjoys the exclusive right to engage in oil exploration, exploitation, production and marketing in the cooperative areas.

Since China National Offshore Oil Corporation called for the first round of foreign bids in 1982, 59 companies from 16 countries and regions had signed 100 contracts and agreements with China by 1994, resulting in a direct use of foreign investment amounting to U.S.$4.5 billion after four rounds of bid invitation and bilateral negotiations.

By cooperative exploration, 20 oil and gas fields had been found with an accumulated geological deposit of 1200 Mt of oil and 180 billion m^3 of gas. Thirteen oil and gas fields had been built and put into production, seven oil and gas fields were under construction. The output of crude oil in 1994 was 6.47 Mt.

The opening to the outside world of 11 southern provinces and regions had met with the approval of the State Council in 1985. By 1994, five agreements on cooperative exploration and exploitation and three joint research study agreements had been signed after calling for bids and bilateral negotiations, which covers an area of 257,600 km^2 and an investment of U.S.$132 million is anticipated. The State Council promulgated in 1993 the "Regulations of the People's Republic of China Concerning the Exploitation of On-Shone Petroleum Resources in Cooperation with Foreign Enterprises " and China National Petroleum Corporation (CNPC) takes the overall charge of the cooperative businesses with foreign countries, or with "one window handling foreign business." CNPC enjoys the exclusive right to engage in oil exploration, exploitation and production in the cooperative areas.

China invited foreign bids for oil in some areas of the Talimu basin in Xinjiang in 1993. In 1994, some areas of 11 provinces and regions in North China were opened to the outside world for risk exploration covering 417,900 km^2. Two rounds of foreign bids have been made. The first round mainly involved five areas in the southeast of Talimu and two oil contracts and one physical exploration agreement have been signed with foreign oil companies. The second round bids mainly concerned with cooperative research and the raising of the rate of yielding in old oil fields.

2. Special Oil Materials and Equipment

Being one of the major oil producing countries in the world, China needs large quantities of special oil materials and equipment. At present CNPC has more than 50 manufacturing factories and four equipment research institutes which provide 70% of domestically made oil equipment. However, there is still a need for import of large quantities of oil equipment each year. For example, more than 800,000 tons of special oil pipes are needed each year, the bulk of which has to be bought abroad; 30% of special oil exploration equipment and 20% of exploitation equipment have to be imported, too.

VI. Main Problems

The production and supply of oil and natural gas fall short to meet the needs of the development of the national economy, the gap between supply and demand is growing and this situation can hardly change in the near future, which shows in the following:

1. The difficulty with the exploitation of the existing oil fields is growing and the cost is fast increasing;

2. Insufficient attention has been paid to the exploration and exploitation of natural gas. As a result, the natural gas industry developed slowly;

3. The oil industrial system has not been straightened out and rationalized. The upstream and downstream of the oil industry are separated, which affects the development of the oil industry;

4. The prices of crude oil and natural gas remained too low for a long time, which is not conducive to the work of oil conservation.

Chapter 5. Rural Energy and New Energy

I. Summary

The construction of rural energy and the development of new energy resources is an important part of China's energy construction, but also is of great significance in the improvement of ecological environment.

A planned and organized development and utilization of rural energy and new energy resources started first in the Sixth Five-Year Plan (1981-1985). There was a shortage of fuel for the rural people's daily life. An average of four months' shortage of fuel of all rural households a year caused destruction of forests and vegetation, soil erosion and desertification. In view of this, experiment and demonstration was made, choosing places where there was serious shortage of fuel to develop rural energy and intensify the reform of kitchen range in order to save firewood, and to do research and promote the building of biogas-generating pit with rural households. All this helped to relax the shortage of energy in some places. To increase the supply of rural energy, great efforts had been made to develop firewood forests and small hydropower stations. Scientific research was done in new energy resources of windpower, solar power, geothermal power and tide power, for which experiment, demonstration and promotion in small scales was also made.

The reform and opening to the outside world has sped up the development of the rural economy and the quality of rural people's life has generally improved. Thus the consumption of rural energy saw great changes in both quantity and mix. The consumption of various energy in the rural areas in 1994 amounted to 615 million TCE, or 1.87 times that of 1980. Of which, commercial energy amounted to 367 million TCE or 3.65 times that of 1980. The ratio of the consumption of commercial energy to that of non-commercial energy changed from 3:7 in 1980 to 6:4 in 1994.

For the purpose of exploring an effective way to solve the problem of rural energy that suits China's national conditions, experiment of a "comprehensive construction of rural energy was made in 18 counties in China in the Sixth and Seventh Five-Year Plan periods. Practice has borne out that this is effective to accelerate the construction of rural energy. To gradually popularize the successful experience, eight commissions and ministries including the State Economy and Trade Commission, the State Science and Technology Commission, the Ministries of Finance, Agriculture, Forestry, Water Conservancy and Electric Power, with the State Planning Commission taking the lead, jointly carried out a comprehensive construction of rural energy in 100 counties in the Eighth Five-Year Plan and planned to build 200 counties into the initial rural electrification county on the basis of the fulfillment of 109 counties of initial rural electrification.

II. Consumption of Rural Energy

The vast Chinese rural areas are a major energy consumer. The rural energy consumption was 615 TCE in 1994, or 45% of the total energy consumption in China as a whole (bioenergy included).

Compared to the urban areas, the rural energy consumption has the following characteristics:

1. Energy used for household takes the bulk of the energy consumption and bioenergy is dominant in all the energy consumed;

2. The per capita consumption of energy is low. In 1994, the per capita energy consumption, the per capita consumption of commercial energy, the per capita electricity consumption and the per capita daily life consumption of electricity was 0.67, 0.4, 183 kWh and 41 kWh, respectively, equivalent to 58%, 42%, 25%, and about 50% of the urban residential consumption of electricity;

3. There is marked disparity among different places. The growth of commercial energy consumption was quick in places where the economic development was fast and they took a large share, while those places where economic development was slow, both the consumption level and the quality of energy were low. There were 110 million rural residents that still had no electricity to use in 1994.

In the last decade and more, the structure of rural energy consumption saw apparent changes. The consumption of commodity energy rose drastically, an increase of 19 MTCE annually from 1980 to 1994, while the consumption of non-commercial energy remained the same as in the past, something between 230 and 250 MTCE. The consumption of high quality fuel such as liquefied petroleum gas and biogas grew quickly, too, in the rural areas. More than 35 million rural households have come to use high quality gas fuel by now.

III. The Construction of Rural Energy and New Energy

1. The Construction of Rural Energy

To enhance a coordinated development of the construction of rural energy and rural economy and ecological environment, the eight central commissions and ministries have jointly carried out a comprehensive construction of rural energy in 100 counties with county as unit and based on different types of counties in the entire China. By the end of 1994, the rate of fulfillment of the project had been more than 80%, initial results had been achieved in comprehensive construction.

—Township and village collectively-owned coal mines

The township and village collectively-owned coal mines take advantage of the local labor forces and exploit shallow layers of coal in designated areas with the approval of the authorities concerned. Their products were mainly sold in the locality. The development of the township and village collectively-owned coal mines helped to improve energy supply in the rural areas as well as in the country as a whole and played an important role in enhancing the rural economic development, increasing rural people' s incomes, reducing pressures of investment and transportation on the state. The policy adopted by the state for developing township and village collectively-owned coal mines can be summarized as a principle of "support, reform, rectification, combination and raising the level" so as to constantly improve their technological equipment and gradually realize economic production by scale and improve their safety conditions and the rate of return. The township and village collectively-owned coal mines in the whole country produced raw coal of 490 Mt in 1993, or about 42.6% of the raw coal produced in the country in the same year; and the output of 1994 was 520 Mt, or 43% of the country's total.

—Small hydropower station

The small hydropower resources (with a total installed capacity per station below 25 MW) that can be exploited in China amounts to 76 GW. To fully develop these resources is an important way to solve the difficulty of rural electricity supply and promote the electrification of the rural areas, particularly it will play a significant role to help the people in the poverty-stricken areas. The state encourages and supports the construction of small hydropower stations in the rural areas to develop production and shake off poverty and become prosperous. By the end of 1993, there had been altogether more than 6,000 small hydropower stations in the whole country with a total installed capacity of 15 GW, generating power of 40.4 TWh; and that by the end of 1994, 15.65 GW, generating power of 49 TWh. Now China has 40 rural hydropower networks with high voltage power transmission lines totaling 780,000 km and equipment of electric transformer and distribution of 19.99 million KVA.

To promote the process of rural electrification, 200 counties with initial electrification are being built in the Eighth Five-Year Plan period on the basis of the building of 109 counties with initial electrification dominant by hydropower.

—Firewood forest

Firewood will remain an important fuel in China's rural areas for a fairly long time to come. The Ministry of Forestry takes firewood forest as a kind of forest and is carrying out a plan to build firewood forest. By 1993 China had a recoverable area of firewood of 6 million hectares and 200,000 hectares of firewood forest were planted in 1994.

—Biogas

Biogas has come to a stage of steady development in China. Besides a continuous development of household use biogas pits, there was also development of large and medium-sized projects of concentrated supply of biogas. In 1994, 5.4 million households used biogas, which generated gas of 1.27 billion m^3, or an increase of 84 million m^3 on top of that in 1993. There were more than 6,000 large and medium-sized biogas projects with a central supply of biogas to 84, 000 households. Besides, there were two biogas power stations with an installed capacity totaling 3,000 kW.

People in the rural areas have not only used biogas for cooking and lighting fuel but also used the gas, liquid and sediment in a comprehensive way and have acquired good economic and environmental results. By the end of 1994, the sowing areas using seeds soaked in biogas-pit liquid were popularized to 620,000 hectares with an increase of grain of 920,000 tons; 24,700 grain storage using biogas were built, which cut the grain losses of 28,700 tons; there were 30,000 sanitation-use biogas

projects in the urban areas, which processed residential waste water of total population of 2. 9 million.

—The rural energy industry

By 1994, there had been more than 50,000 enterprises manufacturing kitchen ranges of conservation of firewood or coal, using biogas or other kind of gas, mini hydropower or solar power equipment. They had employed 170,000 workers and staff members, with total fixed assets of RMB 1.4 billion yuan and an annual output value of RMB 2.5 billion yuan.

2. The Development and Utilization of New Energy

China is a country with a vast territory, having abundant resources of various new kinds of energy. Progress has been made in developing new energy and an industry of new energy is taking shape.

—Windpower

China has frequent monsoons with usable resources of windpower of about 250 GW. The windpower resources mainly are distributed in the two major wind belts. The coastal wind belt has an effective wind energy density of above 200 w/m² and the frequency of effective wind force is as much as 89-90%; the northern wind belt (a line from Xinjiang, Gansu through the Inner Mongolian plateau) has a wind energy density of 200-300 w/m² and the frequency of effective wind force is around 70%. By 1993, 130,000 units of small windpower generators for household use had been popularized in the whole country, which had a total capacity of 17 MW. They increased to 140, 000 units in 1994. They are mainly distributed in remote pastoral areas, mountainous areas and on islands. Fourteen windpower fields had been built, which had operated and connected to electric networks, having 96 generators with a total capacity of 13.4 MW. Of which the largest generator has a capacity of 450 kW. Large and medium-sized windpower generator numbered more than 120 in 1994 with a total installed capacity of 30 MW. Of which the Dabancheng Windpower Field in Xinjiang had an installed capacity of 10 MW, being the largest windpower field in China. Besides, there are 1,250 units of windpower water pumps.

—Solar energy

More than two-thirds of the Chinese territory has annual sunshine above 2,000 hours and an annual radiation about 5.9 x 106 KJ /m². It mainly distributes in the Qinhai-Tibet plateau, Inner Mongolia, Ningxia, northern Gansu, Shanxi, Northwest Hebei, southern Xinjing, Northeast China and some places in Shaanxi, Gansu and Ningxia. In 1993, solar photovoltaic cell of 3.8 MW was used in the whole country, which increased to 5 MW in 1994. The largest photovoltaic power station was in Tibet with a capacity of 25 kW. It was mainly small photovoltaic systems that were popularized for household use, TV transposer and communications. As regards the utilization of solar heat, the heat collection areas of solar water-heaters reached 2.3 million m² and there were passive solar houses of 5 million m², agricultural greenhouses heated by solar of 225,000 hectares and 140,000 solar kitchen ranges in 1993; and these increased, respectively, to 3 million m² (including those of advanced vacuum tube, copper-aluminum compound plate tube and simple plastic bags), 5.75 million m², 250,000 hectares and 140,000.

—Geothermal energy

High temperature heat deposits in China are mainly distributed in places including southern Tibet, western Yunnan, Fujian, Guangdong and Taiwan, geothermal resources of medium and low temperature spread throughout the whole country. Natural outcrops alone are found more than 3,000. The installed capacity of geothermal energy reached 28.6 MW, of which Yangbajing Geothermal Power Station in Tibet has an installed capacity of 25 MW, or 41% of electricity the Lhasa power network supplies, accumulatedly having generated electricity of more than 500 GWh. The direct utilization of medium and low temperature geothermal resources is mainly found in places like Tianjin, Beijing, Hebei (Xiongxian county, Gu'an county and the Baiyangdian area), and city Fuzhou, with an annual utilization equivalent to 300,000 TCE. There are more than 860 geothermal heating facilities for agricultural use serving a total area of planting and animal husbandry of over 18 million hectares.

—Oceanic energy

On China's long beaches and in territory waters, there is abundant oceanic energy. Of which the exploitable tidal energy amounts to 21.7 GW which distribute mainly in provinces of Zhejiang and Fujian, where the exploitable tidal energy amounts to 90% of the total. At present China has built seven tide power stations with a total installed capacity of 6 MW, among which that of Jiangxia Tidal Power Station is 3.2 MW. Besides, a tide-flood power station is built with an installed capacity of 5 MW and more than 300 small wave electricity generating devices used as the energy source of navigation marks have been built, too.

IV. Problems With Rural Energy and New Energy

The resolution of the problem of energy is a long and arduous task for a large agricultural country as China.

—In spite of the progress that has been made in rural energy and new energy in recent years, a stable, reliable

and economic supply system of commercial energy has not been built yet. There are 17 counties without electricity, 110 million rural residents do not have the supply of electricity.

—The mix of rural energy fails to be rational. For a long time so far bioenergy has been overly consumed, which has a negative influence on both the economic development and the improvement of the rural people's life quality, as well as on environmental protection.

—The low efficiency of energy transformation and high cost of equipment is the problem people are facing when developing new and renewable energy, which has restricted the popularization of new and renewable energy.

—There is a lack of policy support for the development of rural and new energy which is beset with difficulties such as shortage of funds.

Chapter 6. Energy Conservation

I. Summary

Energy conservation is a long-term strategic policy in the development of China's national economy, which not only has a direct bearing on guaranteeing the supply of energy resources, promoting technological progress and raising economic performances, but also is an important means to protect the environment and reduce pollution.

China began a planned and organized conservation of energy in the early 1980s. In the decade and more, following the principle of "paying equal attention to the development and the conservation" of energy resources and with efforts made in all walks of life, both the utilization efficiency of energy and the economic performances in all industries have raised, and the per unit output value of energy consumption has been reducing year after year. Along with the major reforms taking place in the national systems of finance, price and investment, a new situation appears in the deployment of resources taking advantage of the market mechanism, which has produced an energy conservation effect. In the meantime, the state has laid great emphasis on environmental protection and strengthened the work to the effect, the popularization and application of fuel gas and coal for civil use, as well as centralized supply of heat have all worked to raise the efficiency of energy.

The acceleration of building the socialist market economic structure and the opening to the outside world have promoted the regulation of the industrial structure and the product structure. Coupled with progress in energy conservation technology, the energy consumption per unit output value has shown a downward trend and the domestic demand on energy resources increased slowly.

In the 10 years from 1981 to 1990, the average annual growth rate of GNP was 8.98% while the average annual growth rate of energy consumption was 5.05%. The energy consumption of every RMB 10,000 yuan of GNP was 7.64 TCE in 1980 and 5.32 TCE in 1990 with an average yearly rate of energy conservation of 3.6%; calculated by the energy strength of GNP, the accumulated savings of energy amounted to 270 Mtce. The GNP growth rate from 1991 to 1994 was 11.7% annually, the average growth rate of energy consumption 5. 6%, the rate of energy conservation reached 5.4%, or an accumulated savings of energy amounting to 284 Mtce. Of the above-mentioned energy conservation, that of structural savings consisted of two-thirds of the total.

II. Management of Energy Conservation

The Chinese government promotes energy conservation mainly by economic, legal and administrative means of macroscopic regulation and control so as to prompt the enterprises to intensify their management of saving energy.

The government worked out the five-year plan of energy conservation for the Sixth, Seventh and Eighth Five-Year Plans, put forward ideas on energy conservation for the Ninth Five-Year Plan and annual plan, thus including it into the medium-term and long-term socioeconomic development. Then targets of saving energy were raised for each and every place and department, plans and measure as well as examination indexes were made known to lower level. The localities and departments would break down the targets and give guidance to energy saving work in the enterprises.

Since 1981, the state has made and promulgated a series of legal norms and standards concerning energy conservation. The "Interim Regulations of the Management of Energy Conservation" approved and promulgated by the State Council in 1986 defines in principle the management system, the management of industrial and daily life use of energy, the technical progress in energy saving, training and reward. "Several Regulations on Further Intensifying the Electricity Saving" approved and relayed by the State Council in 1987 gives principle definitions on quota management of electricity consumption, saving energy by regulating electricity load, popularization of energy saving equipment and electricity saving new technologies. In 1992, the State Planning Commission, the former Economic and Foreign Trade Office under the State Council and the Ministry of National Construction jointly promulgated the "Interim Regulations

on Adding an Article (Chapter) to the Feasibility Study Reports of Capital Construction and Projects of Technological Innovation." The "Energy Conservation Law of the People's Republic of China," (draft to be submitted for examination), the draft of which was jointly organized by the State Planning Commission and the State Commission of Economy and Foreign Trade in 1993 and which has now been submitted to the State Council and for discussion in the Standing Committee of the National People's Congress for consideration. Besides, 23 items of rules and regulations and legal norms on energy conservation, 27 items of design norms of energy conservation for 14 industries, and more than 100 items of energy saving standards have been worked out.

The state offers preferential policy including reduction and exemption of taxes on energy saving projects, for example, there shall be no regulatory tax for fixed assets investment oriented towards energy conservation; loan of discount interest for energy conservation projects of technical innovation; and tax reduction or exemption for new products that can save energy. Demonstration and popularization of products that save energy were arranged and corresponding products of high energy consumption and low efficiency were required to be sifted out within a specified time. An energy conservation propaganda week was fixed for every October. Various forms of contract responsibility system of energy conservation were implemented in enterprises, so that those who saved energy were rewarded and those who used energy exceeding designated quotas were punished. All this worked to improve the energy conservation management system.

An energy conservation system from the Working Meeting on Energy Conservation of the State Council down to enterprises was formed in China suited to the Chinese conditions. Besides there are monitor and service organs, such as the National Monitoring Center of Energy Conservation and the Technical Service Center of Energy Conservation, as well as civil energy saving organizations like China Association of Energy Conservation, Energy Conservation Committee under China Energy Resources Society, and China Association for Energy Conservation in Construction.

III. Energy Conservation in Industry and Transportation

In 1994, the energy conservation achieved in the sector of industry and transportation amounted to more than 800 Mtce coal, or 70% of the total terminal energy consumption in the whole country, thus the sector being a key one in energy conservation.

Based on the price of 1990, the comprehensive energy consumption per every RMB 10,000 yuan of the total industrial output value at the county level and above dropped from 2.44 TCE in 1993 to 2.28 TCE in 1994, and the energy conservation rate with industrial enterprises in 1994 was 6.56%. The unit energy consumption of major industrial products (quantity of work) all dropped to various degrees: equivalent standard coal consumption for electricity supply dropped form 416 g/kWh in 1993 to 413 g/kWh in 1994, a drop of 3 g; the comprehensive energy consumption per ton of steel (in the whole steel industry) fell from 1,545 kg coal equivalent to 1,519 kg coal, equivalent or a drop of 25 kg of coal equivalent.

IV. Energy Conservation in Urban Residential and Commercial Use

With the accelerated process of urbanization in China, the demand of energy among the urban residents and commerce grew by a large margin. In 1992, the urban civil use of energy was 85 Mtce (of which electricity being 35.9 TWh), an increase of 30% over that of 1990.

Energy conservation with urban residents and commerce mainly involves developing fuel gas and district supply of heat, popularizing energy conservation in construction, raising the energy efficiency of household electric appliances and lighting and promoting shapes coal (briquette). In recent years, the sale of shaped coal briquette for civil use in the urban areas has reached above 40 million tons, of which honeycomb briquette comprised of 38 million tons, which compared to use of bulk coal meant more than 15% saving of coal. By 1993, more than 600 cities and counties had supplied fuel gas, the liquid petroleum gas for urban residents' daily use was 3.089 million tons, natural gas 6.36 billion m^3, gas 13.8 billion m^3, with a coverage of 56.9% of urban residents. By the end of 1992, centralized heat supply facilities had been built in 158 cities, or 30% of all the cities; the areas covered by centralized heating totaled 328.32 million m^2 with a thermalization rate of 6.92%, or an increase of 37.4 times over that of 1989. By the end of 1993, the capacity of heating equipment based on power heat combined production had reached 15.5 million kW with a yearly heating capacity of 819.52 million GJ.

With energy conservation in construction, the authorities concerned have made design standards and legal norms on energy conservation in heating residential houses. Since 1993, the design standards and the standardization of general design of 1980 have been followed in all the newly built residential houses in places of cold climate, resulting in a energy saving rate of over 30%. Furthermore, special scientific research and development projects were arranged by hundreds, heat preservation building materials were developed, model district of energy conservation buildings were put up in

places like Beijing and Harbin and about 40 million m^2 of energy saving residential houses have been built by now.

To promote energy savings in household electric appliances, the state has made the national norm of electric consumption for 10 categories of household electric appliances, including household refrigerator, air conditioner and washing machine. Research has been done to develop and manufacture energy saving household appliances. Moreover, some hotels and restaurants have adopted energy saving lighting, which has reaped good economic results.

V. Energy Conservation in the Rural Areas

The rapid development of the rural economy and improvement of the rural residents' living conditions have raised great demand on energy, sharpened the shortage of power supply in the rural areas. As a result, governments at various levels pay great attention to energy conservation in the countryside.

As regards daily use of energy in the rural areas, emphasis has been laid on firewood-saving kitchen ranges. By the end of 1994, 165 million farmer households, or 69% of all the farmer households all over the country had used firewood-saving kitchen ranges, with a capacity of saving 30 Mtce. Besides, there had been a popularization of briquette of 33 million tons; about 34 million households had used various high quality fuel gas including methane; more than 16 million households had used electric cooking wares; solar energy devices such as passive solar room, solar water heater, solar heating greenhouse and livestock pen, and solar kitchen ranges, have been popularized and applied in the rural areas. All this had reaped very good economic, social and ecological, as well as environmental results.

In energy conservation for agricultural production, work was done to demonstrate and popularize oil and electricity saving technical innovation in diesel motor, irrigation and pumping system and electric networks for agricultural use, adopt rational fertilizing and water saving irrigation skills of low energy consumption and reduce the input of energy in agricultural production. More than 1 million diesel motors for agricultural use have finished a comprehensive technical innovation, resulting in a saving of diesel oil of about 200,000 tons a year.

In energy conservation with township and village industries, the emphasis was laid on raising the efficiency of energy in the production of those products that have a high consumption of energy, such as brick and tile, cement, coking, paper making and ferroalloy, which had a total energy consumption comprising of more than half of the aggregate energy consumption in the township and village enterprises. Hence 14,500 energy saving brick kilns were built and 12,300 backward kilns eliminated, saving energy in the same year amounting to 2.39 Mtce. Furthermore, technical innovation oriented towards energy conservation was carried out in processing technologies for agricultural and side line products that have a high consumption of energy, hence 29,400 tea stir frying stoves and 43,800 tobacco flu curing rooms were revamped.

VI. Energy Conservation Investment

The Chinese government has made necessary investment in the capital construction and technical innovation of energy conservation since the 1980s and the investment has been increasing year after year. In the 10 years from 1980 to 1990, a total of RMB 17 billion yuan was invested in energy conservation capital construction with an energy conservation capacity of 25 Mtce, RMB 10 billion yuan in energy conservation technical innovation with an energy conservation capacity of 30 Mtce.

From 1991 to 1994, the energy saving investment in the whole country was RMB 32 billion yuan, of which RMB 10.4 billion yuan was allocated by the state for capital construction and technical innovation and RMB 21.6 billion yuan was self-financed by the localities and enterprises concerned.

VII. Main Problems With Energy Conservation

The efficiency of energy utilization was low in China, whose per unit energy consumption of the majority of products is higher than that in advanced countries, for example, energy waste is serious in industries with high energy consumption among township and village enterprises. Main problems in energy conservation are as follows:

Energy conservation policy and legal norms fall short of meeting the needs of the new situation in China. The former policies for encouraging energy conservation only a few such as the regulatory tax in investment orientation of fixed assets are adopted at the present; some departments and localities relaxed their administrative management of energy conservation while the necessary economic and legal means were not available in time, causing weakening work norms and guidance in energy conservation in recent years. Moreover, there is a lack of sense of urgency for energy conservation owing to the lack of awareness of energy conservation, which had an impact on a smooth implementation of energy conservation work.

Insufficient input is an outstanding problem in energy conservation at present. There was an enthusiasm for developing energy in all localities and at all levels

while the input in energy conservation was relatively little. This impeded the transformation of the Chinese economy from an extensive increase of quantity to an intensive increase paying attention to economic performances.

Chapter 7. Prospects of the Energy Industry in the Ninth Five-Year Plan

According to the Ninth Five-Year Plan of the national economy and social development and the overall strategic target of the plan to 2010, the growth of the Chinese national economy will remain high at 8% (1996-2000). To this purpose, energy resources have to grow correspondingly and will gradually relax the "bottle-neck" effect.

Energy supply in China will mainly rely on domestic resources and market, and at the same time, the supply will be regulated by making full use of foreign resources and international market, based on the current situation in the Chinese energy industry, the development of the energy market and the conditions of the resources. The policies will continue to adapt to local conditions and to mutually complement by various energies; to lay equal emphasis on both development and conservation with energy conservation being put at a dominant position; and to maintain a harmonious development of energy, the national economy and the environment.

I. The Guideline of Energy Development in the Ninth Five-Year Plan

The energy construction in the Ninth Five-Year Plan will take electricity as the core and coal as the basis, strive to exploit oil and natural gas, actively develop new and renewable sources of energy, optimize the structure of energy and increase the supply of energy of high quality.

(1) The development of coal mining must stick to the principle of integrating the central with the local, taking the large and medium-sized coal mines as the dominant and promoting a diversified operation of coal enterprises with coal as the key.

In the Ninth Five-Year Plan period, under the premise of a rational arrangement of the exploitation strength in productive mines, the coal output quantity of old mines in East China will remain stable, geological exploration in the depth and surrounding life of the mines in the east will be intensified, the service life of the mines will prolong; and at the same time, the implementation of the strategy to shift coal construction to the west will accelerate. The construction of new mine areas and shafts will take economic results as the center and the transformation of the operation mechanism of enterprises as the motive force, the establishment of modern enterprise system as the means in order to realize the goal of less manpower, high efficiency and good economic results in coal enterprises.

Key state-owned coal mines must actively regulate their industrial and product structures, do a good job in planning a diversified economy and realize a comprehensive development in the course of their reorganization and transformation. The implementation of the guideline to support, transform, rectify, raise and combine the township and village-run coal mines will continue in order to usher them on the road of a sound and ordered development. Coal industry will broaden channels to foreign cooperation, actively introduce foreign investment and encourage foreign businesses to take part in the construction and operation of coal mines in China.

(2) The guiding line to develop oil industry in the Ninth Five-Year Plan period should be to take economic results as the center and raise the level of scientific management; and to intensify the exploration of oil and natural gas and find more resources to increase standing-by deposits in order to achieve a stable growth of the output of oil and natural gas. At the same time, foreign resources should be made full use of meeting the needs of the development of national economy.

For oil on land, China will continue to uphold the policy to "Stabilize the east, develop the west, lay equal emphasis on oil and gas and broaden the opening to the outside world." As to the offshore oil, the principle of "Insisting the opening to the outside world, stepping up self-operation, laying emphasis on both oil and gas and making steady progress" shall be followed .

To stabilize the east: "To stabilize oil output and control water" will be the policy in the old oil fields. At the same time, to carry out the third-time oil exploitation technique, raise oil yield, and prolong the life of stable oil yielding; the old oil fields will also continue to implement the rolling exploration and exploitation; develop off-shore zone oil fields of low infiltration in order to increase the output of crude oil; accelerate the exploration in peripheral basins, find new oil fields and timely put them into exploitation, do a good job in the replacement of deposit and output; for those oil deposits that have been ascertained but not used, choice should be made to use and develop the good ones in accordance with economic results.

To develop the west: Xinjiang should be taken as the main battlefield for oil in the west region, a good organization should be made to explore and exploit the three major strategic areas of Talimu, Zhungeer and Tulufan basins. Exploration will take a dominant position, the production of crude oil will be arranged according to

the conditions of transportation and utilization of associated gas.

To lay equal emphasis of oil and gas: intensifying the exploration and exploitation of natural gas and strive to alter the current situation of imbalance between the proportion of oil and gas output.

To broaden the opening to the outside world: Making use of both the domestic and foreign resources to meet the needs of the development of the national economy. To attract foreign techniques and funds to take part in cooperative exploration and exploitation in China; in the meantime, exploration should be made to see how to take advantage of Chinese techniques and human resources to take part in exploitation of oil and gas fields abroad.

(3) The electric power industry will carry out the policy of "separating the functions of government from those of enterprises, taking province as an entity; combining power networks, practicing unified state control, and raising funds to run power undertakings," and "suiting measure to different provinces and networks." Priority will be given to hydropower development and great efforts should be made to develop thermal power, and nuclear power will be developed to an adequate degree. The development of hydropower should follow a guideline of integrating large, medium-sized and small projects to realize a cascade-rolling-development and comprehensive utilization. Major efforts should be devoted to building thermal power plants near coal mines and a number of thermal power plants near harbors and highways should be built according to transportation conditions on land or on sea and rivers. The construction of nuclear power must follow the principle of "seeking Sino-foreign cooperation and taking China's self-reliance as the dominant factor"; emphasis will be laid on domestically produced equipment and integrating with appropriate introduction of foreign equipment so as to prepare for a greater development of nuclear power in the future.

The guideline of giving priority to the development of hydropower in order to reduce environmental pollution, mitigate the pressure on coal production and transportation. The development of hydropower will be carried out following the principle of cascade rolling development, integrating large, medium-sized and small projects, paying equal attention to both high and low heads of water, and comprehensive utilization. In the layout of the development, attention will be paid, first and foremost, to the building and exploitation of the large hydropower bases on the trunk and branches in the upper and middle reaches of the Changjiang (the Yangtze River), the upper and middle reaches of the Huanghe River (the Yellow River), the Hongshuihe and the Lancangjiang. Medium-sized hydropower stations will be actively built wherever there are the conditions. A number of pumped-storage power stations will be built to solve the problem of system peak regulation in those power networks with poor capacity of peak regulation and a large gap between peak and valley. To rationally deploy resources and improve the structure of primary energy resources, the process of "transferring hydropower from the west to the east" will be actively promoted.

The development of hydropower has very good economic as well as social results, such as flood prevention, irrigation and navigation. The state will take measures to create a good macroscopic environment of investment to accelerate hydropower exploitation. To increase the capacity of hydropower companies along the rivers to build new power stations by rolling development relying on existing power stations and that of the state to build backbone hydropower stations, the state should adjust price of electricity with old hydropower stations and collect surcharges of central hydropower construction funds step by step.

Where there is no hydropower station as a basis, or where the existing hydropower stations have not the ability to a rolling development, the state will allow the return of the state's input into the first two stations on a river to be used as loan building later hydropower stations till there is the ability for a rolling development.

The development of nuclear power will implement a principle of seeking Sino-foreign cooperation and "taking China's self-reliance as the dominant factor" and the stress will be laid on the early stage preparation and producing equipment in China. The domestic production of nuclear power equipment started from pressurized-water reactor of 600 MW, during which key parts and accessories, design and manufacture technologies will be introduced from abroad, then digested and absorbed to realize Chinese production of nuclear power equipment. On this basis, China will research and manufacture nuclear generator units at the level of GW.

As regards the future development of nuclear power, priority will be given to those areas including the coastal areas and East and South China, where there is shortage of primary energy resources, can accept high price of electricity and there is a good economic basis. Those projects that conditions are ripe can start construction. To facilitate the management and shorten the construction period and save investment, the principle will be adopted to make an overall planning, deploy a group of reactors and build them in different phases.

The type of nuclear reactor. The technical line that has been defined is to stick to developing pressurized-water

reactor. In the near future, few other types of reactors may be introduced provided that the introduction will be done under very favorable conditions and permissible of domestic matching conditions and deemed advantageous after adequate technical and economic proofs. In view of making full use of site resources and rationality in technology and economy, the power of single reactor should mainly be at GW. Therefore, while accelerating the domestic production of 600 MW of generator unit, preparation should proceed to research and manufacture of generator unit at GW incorporating the introduction from abroad of nuclear power equipment of GW and relative technology in the near future.

The development of nuclear power should take the policy of maintaining nuclear power by nuclear power. Both the enthusiasm of the central and local governments for developing nuclear power should be brought into full play. Input into nuclear power should increase, and a mechanism of maintaining nuclear power by nuclear power and rolling development should be fostered. At the same time, foreign governmental loan and export credit should be actively made use of. Invite foreign direct investment in nuclear power construction in China is welcome. Foreign control of shares in nuclear power stations is not allowed and it must be the Chinese party that takes charge of the operation and management of nuclear power stations.

(4) The development and utilization of new and renewable energy should follow the policy of taking measures adapted to local conditions, various kinds of energy complementing each other, a comprehensive utilization, and paying attention to economic results. The principle of giving guidance according to different categories and promoting a concerted development of both energy and ecological environment should be adopted.

(5) The exploration and exploitation of coal-bed methane should have an overall planning and the gas should be used in a rational way. In the near future, pilot mining of the gas should be done well and priority should be given to the scale development in places where there are good conditions of the resources.

II. The Guideline of Energy Conservation

The guideline of energy conservation in the Ninth Five-Year Plan is: To promote the transformation of the national economy into one of energy conservation type by optimizing the industrial structure, product structure and the structure of energy consumption in the national economy; enhance technical progress, reduce losses and waste of energy and raise the utilization efficiency of energy in each and every link from the production to final consumption.

Meanwhile, as regards the distribution of high energy consumption industries, the state will restrict the development of industries and products of high energy consumption in areas which are short of energy and encourage these industries to shift to energy production bases. The state will, in principle, not approve the construction of high energy consumption projects in areas seriously short of energy and will not guarantee their supply of energy.

III. Ideals on Development in the Ninth Five-Year Plan and by the Year 2010

It is preliminarily estimated that, by 2000, the requirement of primary energy will be about 140 Mtce which will rely primarily on domestic production and supply. Electricity output will reach 1,350-1,400 TWh and the installed capacity of power stations will be 290-300 GW. By then, the shortage of energy will have been relaxed to some degree and power supply, electricity in particular, in some key places will have been fairly well resolved. The development and utilization of rural energy will have seen a great improvement. All counties will have a supply of electricity and 95% of farmer households will be guaranteed to use electricity, in the year 2000.

By 2010, the supply of energy will, in the main, meet the needs of the socioeconomic development, the structure of energy consumption will improve to some degree, and there will be a nationwide electricity network, a system and structure of energy reserve will be initially established. Technology and equipment of energy aspect in China will reach or approach the advanced level in the world. And energy and environment can develop in a concerted way.

Chapter 8. The Macro-Management and Decision-Making System of Energy Industry

I. Summary

The macro-management and decision-making system of energy sector in China is one of government management under the unified leadership of the State Council with the participation of the State Planning Commission, the Ministry of Coal Industry, the Ministry of Electric Power, and other competent departments. The Ministry of Coal Industry and the Ministry of Electric Power exercise, respectively, the management function of the government over the coal and electric power industries. The State Planning Commission is in charge of the overall balance of all the energy industries, the making of major policies, decision making on investment and coordination of major energy issues, and it also exercises the government management function over the

oil industry. Other competent departments mainly include the State Science and Technology Commission and the State Economy and Trade Commission, both of which take some responsibilities for the development of the energy industries in China. The former has established organs in charge of scientific and technological management of energy while the latter has sub-organs in charge of the technical innovation, energy conservation and the dispatching of energy production. Moreover, the Ministry of Water Conservancy is in charge of the construction and management of the hydropower stations and small electric networks for flood prevention, irrigation and water supply under the jurisdiction of water conservancy systems. China National Nuclear Corporation entrusted by the competent authorities in charge is responsible for the overall contract of the nuclear power stations invested by the state, the organization of match projects and cooperation, as well as actively taking part in bidding and construction of nuclear power stations run by localities for civil use.

II. The State Planning Commission (SPC)

1. The SPC is a comprehensive department under the State Council in charge of the national economy and social development. Its main functions are:

(1) Research and put forward the strategic aim and major guidelines and policies of the national economy and social development; organize and work out long-term, medium-term and annual plans of the national economy and social development of the whole country and special development plans of basic industries and pillar industries, plans of the issuance of negotiable securities of the whole country and the reserve plans of major agricultural products, industrial consumer goods and means of production that are of vital importance to the nation's economy and the people's livelihood; and make plans to achieve a general balance between the aggregate social demand and the aggregate supply as well as the overall social funds (including budgeted and extra budgeted funds of the state plan, banking credit, non-state-owned enterprises and individually owned funds and foreign investment) and the coordination of major proportional relation.

(2) Work out together with departments concerned the national industrial policies, and coordinate and supervise their implementation; guide and promote the rationalization of industrial structure.

(3) Organize and plan the development, renovation and protection of national land, development of regional economy, conservation and comprehensive utilization of resources and support of the economic development in the "old revolutionary base areas, national minority areas, frontier and poverty-stricken areas," as well as make plans to achieve rational distribution of the country's productive forces.

(4) Guide and promote the establishment of the national market system, organize the planning of the development of wholesale market, futures market and the key factors market in the country as a whole and in key regions, their distribution and major policies of regulation and control; give guidance to and supervise the state orders, reserve and input of materials of vital importance; monitor the general level of prices, fix and regulate prices of major commodities and standard of fees subject to the state management, and in charge of supervising, inspecting and giving guidance to price work in provinces and departments in the country as a whole.

(5) Define in a rational way the overall size of the investment of fixed assets, sources of funds and the orientation of investment; research in and put forward major policies and guidelines concerning the areas of investment and construction; arrange key state construction projects, examine and issue approval to large and medium-sized capital construction projects and the above-norm projects; work together with departments and regional organs to implement the capital construction's annual plans and organize coordination among major projects, define and give guidance to fix the orientation of the state's long-term investment (including the national capital construction funds, the national special construction funds, the national loan for fixed assets investment permitted by policy, the national investment bonds and forcing investment). Countersign the above-norm technical innovation projects approved by the State Economy and Trade Commission.

(6) Work together with the State Science and Technology Commission and departments concerned to organize the investigation and making of long-term, medium-term and annual plans of scientific and technological development, put forward opinions on the orientation and key points of scientific and technological development and corresponding policies and measures; organize and make plans to tackle key problems in major scientific and technological projects and make plans on major infrastructural construction of science and technology in order to promote the transformation of scientific and technological results into commodity and productive forces.

(7) Make macro economic forecast and conduct monitor, analysis and investigation, coordinate such economic levers such as finance, credit, interest rate, price, tax rates, wages and salaries, and exchange rates, as well as the economic means directly controlled by the state such as investment, foreign currency, foreign loans and the national reserve and ensure the implementation of the

planning, plans and industrial policies by coordinating norms and policies, information guidance, consultation and service.

(8) Conduct investigation and put forward strategy and policies of China's foreign trade, economic cooperation and the utilization of foreign funds as well as the overall size and orientation of foreign investment; examine and approve large, medium-sized and above-norm projects of foreign investment.

(9) Investigate and study major problems in the development of social undertakings, including education, culture, health, sports, broadcast, cinema and TV, tourism, labor and wages, population, civil affairs, politics and law, and social security, and coordinate the mutual promoting relationship between these and the economic development.

(10) Undertake other matters assigned by the State Council.

2. Based on the above-mentioned duties, the State Planning Commission has the following business departments and bureaus:

Department of Long-term Planning and Industrial Policy, Comprehensive Department of the National Economy, Department of the National Land and Regional Economy, Department of Science and Technology, Department of Investment in Fixed Assets, Department of Utilization of Foreign Funds, Department of Finance and Banking. Department of Key Construction, Department of Communications and Energy, Department of Raw Materials and Comprehensive Utilization of Resources, Department of Mechanical Electric, Light and Textile Industries, Department of Rural Economy, Department of Market and Price Regulation and Control, Department of Price Administration, Department of Price Supervision and Inspection, Department of Foreign Economy and Trade and Department of Social Development.

Besides, some non-permanent organs attached to the State Council have also merged into the State Planning Commission, such as "Office of Special Funds for Substituting Oil with Coal," "Office of Nuclear Power," and "Office of Rare-Earth."

III. The Function of the Department of Communications and Energy and Its Internal Divisions

1. According to the "Three Decisions" program of the State Planning Commission approved by the State Council, the main function of the newly established Department of Communications and Energy is defined as: Investigate and study the planning of the development of transportation, communications and energy and the corresponding policies and measures; work together with department concerned to study and prepare the long-term, medium-term and annual plans of transportation, communications and energy industries and be responsible for the registration, examination and approval of large, medium-sized and above-norm projects, as well as the overall equilibrium among various modes of transportation and communications and the coordination on major problems; be responsible for the examination and approval of the planning and plans of relative enterprise groups independently listed in the state plan and coordinate major problems among them; be responsible for the liaison with the Office of Nuclear Power of the SPC and the Office of Substituting Oil with Coal of the SPC.

The function can further branch into:

—Transportation and Communications (explanations omitted)

—Energy:

(1) Study and make development strategy, guidelines, policies and measures.

(2) Study and make development program and plans of energy industries, which mainly include long-term, medium-term and development planning for special projects, annual production and construction plans.

(3) Be responsible for the registration and approval of the large and medium-sized energy capital construction projects.

(4) Be responsible for an overall equilibrium of coal, electricity and transportation and coordination in the implementation of the plans.

(5) Conduct analysis of the energy situation and the demand and supply in the market, investigate and study the foster, establishment and development of energy market under the socialist market economic system.

(6) Be responsible for the examination and approval of the program and plans of the energy enterprise groups independently listed in the state plan and the coordination among them.

(7) Be responsible for liaison with the Office of Nuclear Power, the Office of Special Funds of Substituting Oil with Coal, and China National Offshore Oil Corporation.

(8) Study energy conservation policy, promote the use of new and renewable energy.

(9) Develop foreign cooperation in energy aspect.

(10) See to matters assigned by the leading organs.

2. According to the above-mentioned duty, the Department of Communications and Energy has established 11 function Divisions, among which, the Comprehensive Division, Coal Division, Division of Thermal and Nuclear Power, Hydropower Division, Oil Division, Division of Energy Conservation and New Energy and the Office of the SPC in Charge of the Administration of Oil and Natural Gas Resources are related to energy aspect.

Their functions relative to energy industries mainly are:

(1) The Comprehensive Division: Responsible for comprehensive business in the whole department and relative department in the commission; responsible for comprehensive work in the energy industries, including the long-term planning, medium-term plans and the study of policies on energy industries; the study and synthetic analysis of major problems in the energy industries, play the leading role of development and utilization of clean coal technologies and the leading role in foreign exchanges and cooperation of energy, responsible for the summary of communications and energy, annual production and capital construction plans of transportation; in charge of secretary and office work.

(2) Coal Division: Responsible for the study of development strategy, guidelines and policies of the coal industry; work out long-term planning, medium-term plans and annual production plans, and plans of capital construction; keep abreast of the trends and information in the coal market and forecast and analyze the demand and supply situation of coal, work together with relative departments to study the problems of establishment and improvement of a coal market system; responsible for examination and approval of large, medium-sized and above-norm projects of capital construction; countersign above-norm technical innovation projects approved by the State Economy and Trade Commission; responsible for the examination and approval of the planning and plans of enterprise groups in the coal industry independently listed in the state plan and the coordination among them; take part in the examination of the planning of coal export and import, technical introduction, utilization of foreign investment and scientific and technological development as well as be responsible for the overall balance of coal and making sure of the coal resources for the fulfillment of the state annual orders and take part in the placing of orders for coal.

(3) Division of Thermal and Nuclear Power: Responsible for the study of development strategy, guidelines and policies of thermal and nuclear power; work out long-term planning and medium-term plans of development of thermal and nuclear power, and annual production plans and plans of capital construction; responsible for the examination and approval of above-norm capital construction projects of thermal and nuclear power, and countersign above-norm technical innovation projects approved by the State Economy and Trade Commission; responsible for examination and approval of the program and plans of the thermal and nuclear power enterprise groups independently listed in the state plan and coordination among them; assist relative department to coordinate problems related to power projects in their production and operation; take part in the examination of the import of technology and equipment, utilization of foreign investment, planning of scientific and technical development and pre-arrangement of thermal and nuclear power generating equipment and see to matters relative to the Office of Special Funds of Substituting Oil with Coal and the Office of Nuclear Power.

(4) Hydropower Division: Responsible for studying development strategy, guidelines and policies of hydropower generation; work out long-term planning and medium-term plans, annual production plans and plans of capital construction, and coordinate the early stage work of large and medium-sized hydropower projects; responsible for the examination and approval of above-norm capital construction of hydropower projects, and countersign above-norm technical innovation projects approved by the State Economy and Trade Commission; responsible for the examination and approval of the planning and plans of hydropower enterprise groups independently listed in the state plan and coordinate among them; take part in the examination of the introduction from abroad technology and equipment, utilization of foreign investment, scientific and technical development planning and pre-arrangement of power generating equipment of hydropower; work together with related department to coordinate and see to concrete matters in the construction of Sanxia (the Three Gorges) Hydropower Station.

(5) Oil Division: responsible for the management of the oil industry, study the development strategy, guidelines and policies of oil and natural gas; work out long-term planning, medium-term plans, annual production plans and plans of capital construction, responsible for the overall balance of the resources of oil and natural gas; study and put forward policies and measures on raising funds and the management method of the funds based on the needs of the development of oil and natural gas industry; responsible for the examination of projects of capital construction of downstream products in oil and natural gas industry and countersign capital construction projects taking oil and natural gas as the raw materials; examine the overall program of Sino-foreign cooperative development of oil and gas fields and invitation of area bids and tenders; countersign

above-norm technical innovation projects approved by the State Economy and Trade Commission; responsible for balancing the distribution of natural gas; take part in the examination of the planning of import and export of oil, introduction from abroad of technology and equipment, utilization of foreign investment, and scientific and technical development.

(6) Division of Energy Conservation and New Energy: Responsible for the study of development strategy, aim, guidelines, policies, legal norms and measures of energy conservation and new energy; work out special development plans of energy conservation and new energy and long-term and medium-term plans; put forward annual plan of energy conservation and the development and utilization of new energy resources; keep abreast with and make public the trend and development tendency of energy conservation technique, organize relative departments to popularize technique and equipment of energy conservation, supervise and propagate legal norms relative to energy conservation; responsible for the matters of environmental protection concerning exploitation and rational utilization of energy resources; organize relative departments to carry out work on exploitation and utilization as well as popularization and demonstration of new energy and rural energy; responsible for the examination and approval of above-norm capital construction projects and coordinate among them, and countersign above-norm technical innovation projects handled by the State Economy and Trade Commission; responsible for external exchanges and cooperation in regard to technologies of energy conservation and new energy; responsible for handling specified matters concerning the National Energy Conservation Investment Company; cooperate with the Department of Science and Technology of SPC to carry out scientific research, demonstration and popularization of energy conservation and new energy.

(7) Office of SPC in charge of the Management of Oil and Natural Gas Resources: Responsible for the examination and approval of the applications for registration of exploration and exploitation of oil and natural gas; supervise, inspect and manage the work and activities concerning the registration of exploration and exploitation of oil and natural gas; impose administrative penalty on those who act in violation of laws and regulations on the registration of the exploration and exploitation.

IV. The Ministry of Electric Power

1. The Ministry of Electric Power is a functional department carrying out industrial management of thermal, hydro and nuclear power and power enterprises run by localities. Its main functions are as follows:

(1) Work out the development strategy and major guidelines of the electric power industry based on the requirements of the development of the national economy, and work to achieve and optimize employment of the resources, distribution of power stations and structure of power networks.

(2) Work out the long-term development planning and annual plan of the development of the power industry and to supervise their implementation after the approval by the state; make preliminary examination of the major construction projects of electric power and the above-norm technical innovation projects and put forward opinions on their registration.

(3) Work out the overall planning and major matching measures on deepening the reform of the electric power industry and to promote the enterprises to transform their operational mechanism.

(4) Work out legal norms, major economic and technical policies, essential regulations and procedures of examination and approval, as well as industrial standard of the electric power industry.

(5) Supervise for a safe, stable and optimized operation, the power networks in the whole country; coordinate in the production and construction of power and relationships among all quarters in raising funds to build electric power stations, and carry out the proprietor responsibility system in the power construction, including thermal, hydro and nuclear power; coordinate the relationships between the power enterprises on one side, and the state, the localities and other enterprises on the other, and the relationships among the electric enterprises; and give guidance to a planned use of electricity, conservation of electricity, and to the supervision of the measurement of electric energy.

(6) Work out the scientific and technological development plan of the power industry, organize and tackle major problems in important new techniques, technologies, and products as well as their promotion and popularization.

(7) Supervise the preservation and increase of the value of the state-owned assets in large backbone power enterprises, manage state-owned assets in undertakings directly subordinated to the ministry; cooperate with relative departments in supervising the price of electricity, supervise the economic behavior of the power enterprises and give guidance to the construction of the spiritual civilization in the power enterprises.

(8) Develop economic and technical cooperation and exchanges with foreign governments and examine major projects of technique and equipment to be introduced from abroad.

(9) Conduct a centralized management of the rural electrification in the whole country, coordinate the resolution of major problems in the development of the power industry in the rural areas and promote the power generation to serve the agriculture, the farmers and the rural economy.

(10) Handle matters assigned by the State Council.

2. Based on the above-mentioned duty, the Ministry of Electric Power Industry has established 10 functional departments, including the General Office, Department of Policy, Legal Norm and Structure, Department of Overall Planning and Plan, Department of Economic Regulation and Supervision of State-owned Assets, Department of Personnel and Education, Department of Construction and Coordination, Department of Safety Supervision and Production Coordination, Department of Development of Hydropower and Rural Electrification, and Department of International Cooperation.

V. The Ministry of Coal Industry

1. The Ministry of Coal Industry is a functional department in charge of the whole coal industry under the State Council. The main task of the Coal Ministry includes: Make overall planning; mine and utilize the coal resources in a rational way; optimize the structure of the coal industry, accelerate the development of productive construction, a synthetic use of coal, a diversified economy and the tertiary industry in the coal sector; and promote the transformation of the operational mechanism of enterprises, and foster a coal market; improve operation and management and raise economic results by scientific and technological progress; supervise the preservation and increase of the value of the state owned-asset. Its main duty is as follows:

(1) Research and make guidelines, policies, industrial norms and rules and regulations of the coal industry based on the relative guidelines, policies and legal norms of the state.

(2) Work out the development strategy of the coal industry, the long-term development planning and annual plan; make overall planning of the layout of the coal industry, optimize the industrial and product structure, develop washing, dressing and processing of coal, a comprehensive use, a diversified economy and the tertiary industry; and work to achieve energy conservation and environmental protection in the coal industry.

(3) Make overall planning, mine and utilize the coal resources in a rational way; exercise an industrial and macroscopic management over coal mines of various kinds of investment and various operational forms. Examine major construction projects and above-norm technical innovation projects and put forward suggestions on the registration of the projects, coordinate the internal and external relationships among the key construction projects of the state.

(4) Research and work out the overall planning and matching measures on the reform of the structure of the coal industry and promote its implementation. Promote the transformation of the operational mechanism of the enterprises, foster and develop the coal market.

(5) Coordinate the relationships between the coal sector and the local governments, departments of transportation, electric power and metallurgy, based on the state annual plans of coal production and distribution as well as plans of coal import and export, in order to ensure a normal order of production and operation of the enterprises.

(6) Responsible for the scientific and technological as well as educational work in the coal industry, organize and coordinate the tackling of major technical problems in the coal industry, conduct a central management of technological and measurement supervision. Bring up and train professionals of the coal industry.

(7) Responsible for the economic and technical cooperation and exchanges in the coal industry with foreign governments, develop import and export, and expand the opening to the outside world. Conduct a central administration of the introduction from abroad of major coal technology, equipment and talents.

(8) Supervise and inspect production safety, of coal mines according to the rules and regulations on the coal mines made by the state.

(9) Exercise supervision over, make inspection and assessment of the preservation and increase of the value of the state-owned assets and is responsible for the management of the state-owned assets in the undertakings directly subordinated to the ministry.

(10) Collect and announce the domestic of coal industry and foreign information of economy, science and technology and market, provide services to enterprises and undertakings in information, technology, management, consultation and the exchanges of personnel.

(11) Handle other matters assigned by the State Council.

2. Based on the above-mentioned duty, the Ministry of Coal Industry has established 11 functional departments, namely, the General Office, Department of Policy and Legal Norm, Department of Planning and Development, Department of Production and Coordination, Department of Coal Transportation, Department of Safety, Department of Finance, Labor and Wages, Department of Personnel, Department of Science, Technology and Education, Department of Comprehensive Utilization and

Diversified Economy, and Department of International Cooperation.

VI. National Oil Corporations

1. There are two large national oil corporations at present: China National Petroleum Corporation (CNPC) and China National Offshore Oil Corporation (CNOOC). They are engaged in the upper stream exploration and exploitation of oil. The downstream processing is mainly done by the China Corporation of Petrochemistry. These are the state-owned oil corporations authorized by the state to explore and exploit oil and natural gas and produce oil products.

2. As authorized by the state, CNPC is responsible for the planning, organization, administration and operation of the exploration, exploitation, and production of all the oil and natural gas resources in the entire Chinese land territory (islands, beaches and shallow sea of 0.5 m deep are included) and some downstream petrochemical business. Twenty-one enterprises of oil and gas fields are under its juriadiction, including Daqing, Shengli, Liaohe, Central Plain (Zhongyuan), North China (Huabei), Dagang, Henan, Talimu, Tuha, and Qinghai, with a total oil production of 139 Mt. The corporation has oil workers and staff numbering 1.54 million. It has 266 seismic crews, about 1,000 drilling crews, 10 independent units of scientific research and design, 11 colleges and schools, and an oil refining capacity of 15 Mt per year, which has formed a complete system of petroleum industry. The corporation is also in charge of the work of foreign cooperation in land oil, which exercise a centralized management. The concrete matters are handled by the Bureau of International Cooperation under the corporation in the principle of "one window" towards outside.

3. CNOOC has the exclusive right to engage in exploring and exploiting oil resources in cooperation with foreign countries. It can explore, exploit, produce, process and sell the products as well as conduct other business activities in cooperation with foreign countries or on its own. It is in charge of the foreign cooperation in the field of offshore oil in the principle of "one window" towards the outside, too. It has four regional branch companies in Bohai, East China Sea, East of South China Sea and West of South China Sea, with some 30,000 workers and staff members. It has more than 4,000 ships and units of special equipment like drilling ship, marine operation ship and other matching equipment, the majority of which is up to the advanced level in the world. Now the corporation has put 10 marine petroleum and natural gas fields into production, namely, Chengbei, Bozhong 34-2/4, Bozhong 28-1, Jingzhou 20-2, Suizhong 36-1, Huizhou 21-1, Huizhou 26-1, Lufeng 13-1, Wei 10-3 and Wei 11-4; seven oil and gas fields are under construction. The output of crude oil in 1994 reached 4.63 million tons.

4. Besides the two national oil corporations, the Ministry of Geology and Minerals will set up standard corporation to engage in geological exploration and exploitation of oil and natural gas and will take part in geological exploration and exploitation of oil and natural gas on land and the geological investigation in marine oil and gas. Moreover, there are several small petroleum exploration and exploitation companies run by localities, including Jilin, Changqing, Jiangsu and Anhui.

5. The China Petrochemical Corporation (SINOPEC) is the main corporation engaging in downstream industry of oil, such as oil refinement and the production, construction and marketing of the oil industry. The China National Chemicals Import and Export Corporation (SINOCHEM) is engaging in the import and export business of oil and its products and goes in for international operations.

Chapter 9. Others

I. Development Program of Clean Coal Technology

The Chinese government pays attention to the development and application of the clean coal technology. The State Council has charged the State Planning Commission as the Team-leader and the State Science and Technology Commission and the State Economy and Trade Commission as the deputy Team-leader of the leading team of planning the popularization of clean coal, and will study and make the planning of development and popularization of clean coal technology and make it suit and link to the overall planning of the development of the national economy and energy resources.

II. Industrial Policies Concerning Energy Industries

To accelerate the relaxation of the bottleneck effect on the Chinese economic development for the shortage of energy, China must step up the development of the energy industries and make them full of vitality and vigor. The State Council has charged that the State Planning Commission take the lead to do research in the policy on the energy industries in the Ninth Five-Year and for a longer period. With the joint efforts made by the State Planning Commission and related ministries and commissions, academic research institute, local planning commissions and some enterprises, a revised draft has been prepared, which awaits to further improve and will be submitted to the State Council. At the same time, policies on energy industries like coal, electric power and oil are also being studied.

III. International Energy Cooperation and Policy Dialogue

The Chinese government lays great emphasis on and actively develop dialogue and cooperation as regards energy policies with various international organizations and foreign countries. The various energy related departments and organs in China are working hard in their own fields. The State Planning Commission shoulders the comprehensive responsibility to a coordinated development and the guideline of the development of energy and the economy, as well as energy and the environment. Now, the State Planning Commission has established contacts with related organs of the United Nations and the International Energy Administration (IEA) and is working hard to develop the cooperation. At the same time, the State Planning Commission is the leading unit in China's participation in the Energy Working Group (EWG) in the Asian and Pacific Economic Cooperation (APEC). The Chinese National Committee of the World Energy Council (WEC) is also established in the State Planning Commission. Furthermore, the State Planning Commission has also established formal relations of consultation and dialogue in regard to energy policies with some major energy producing and consuming countries.

China Energy Plates

Figure 1. Distribution of China's Coal Resources

Key: 1-Harbin; 2-Changchun; 3-Shenyang; 4-Hohhot; 5-Beijing; 6-Shijiazhuang; 7-Jinan; 8-Nanjing; 9-Shanghai; 10-Hangzhou; 11-Hefei; 12-Wuhan; 13-Nanchang; 14-Fuzhou; 15-Changsha; 16-Guangzhou; 17-Nanning; 18-Guiyang; 19-Kunming; 20-Chengdu; 21-Zhengzhou; 22-Taiyuan; 23-Xi'an; 24-Yinchuan; 25-Lanzhou; 26-Lhasa; 27-Urumqi; 28-Huang He (Yellow River); 29-Changjiang (Yangtze River); 30-coal fields; 31-coal reserves; 32-coal-producing sites

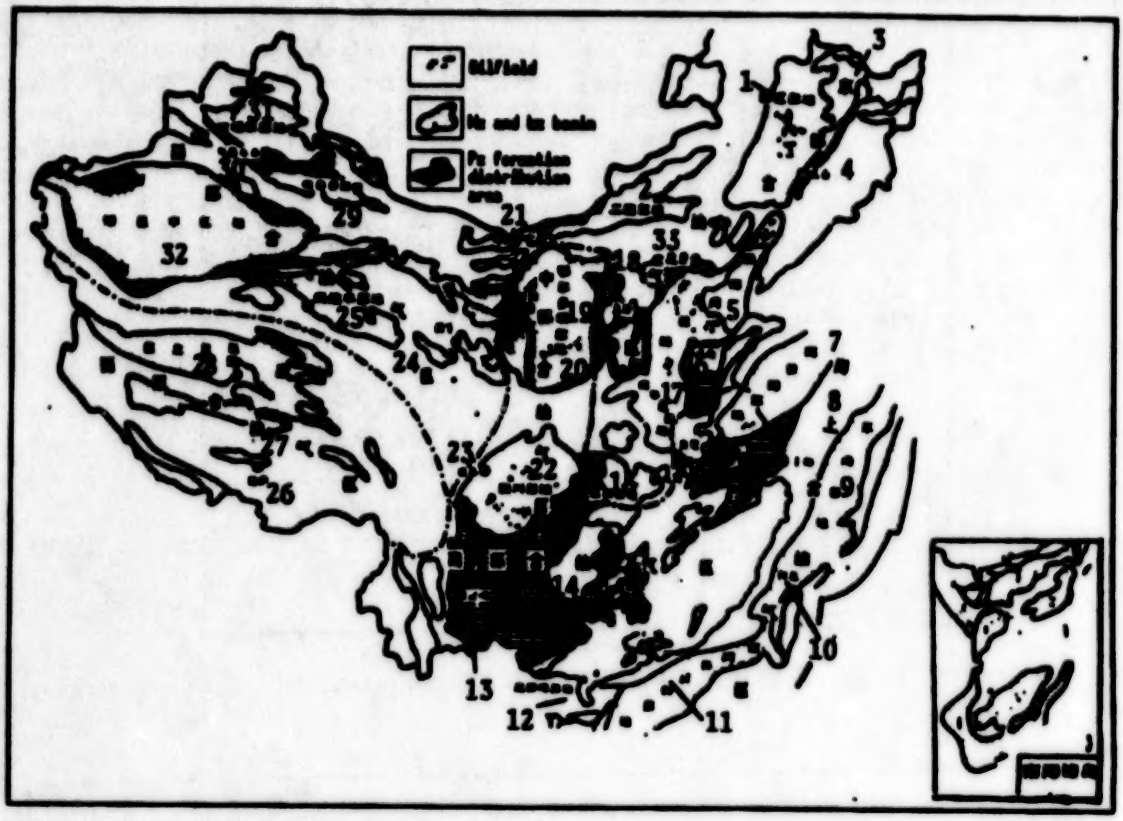


Figure 2. Distribution of China's Oil and Gas-Bearing Basins

Key: 1-Song-Liao (Songhua Jiang-Liao He) Basin; 2-Erlian Basin; 3-Eastern oil and gas reserves region; 4-Changchun; 5-Bohai Bay Basin; 6-Jinan; 7-South Yellow Sea Basin; 8-Sea oil and gas reserves region; 9-Southeast Basin; 10-Taipei; 11-Taiwan-Zhujiang River Mouth Basin; 12-Beibuwan Basin; 13-Kunming; 14-Southern oil and gas reserves region; 15-Jianghan Basin; 16-Hefei; 17-South Huabei (Northern China) Basin; 18-Taiyuan; 19-Ordos Basin; 20-Central oil and gas reserves region; 21-Yinchuan; 22-Sichuan Basin; 23-Chengdu; 24-Western oil and gas reserves region; 25-Qaidam Basin; 26-Lhasa; 27-Tibet (Xizang) oil and gas reserves region; 28-Northern Tibet Basin; 29-Turpan Basin; 30-Urumqi; 31-Junggar; 32-Tarim Basin; 33-Beijing

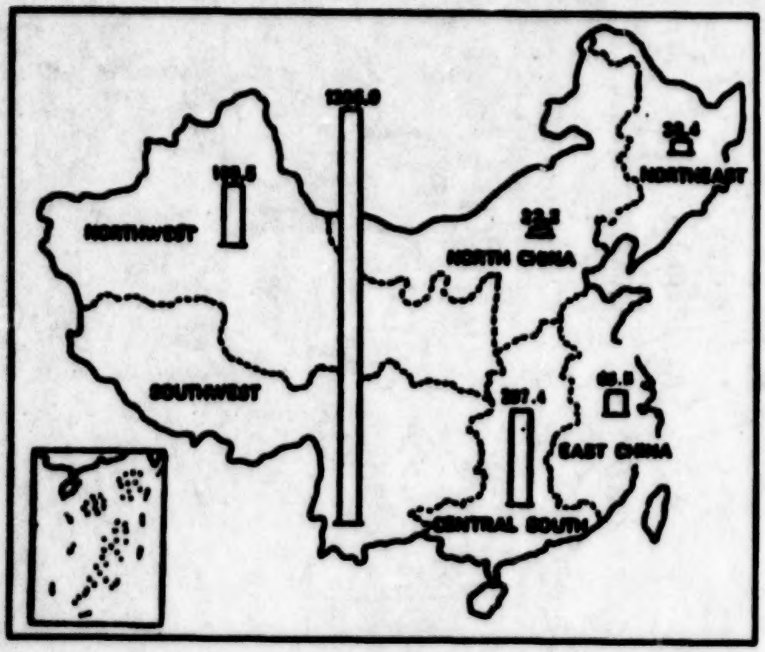


Figure 3. Distribution of China's Hydro Potential

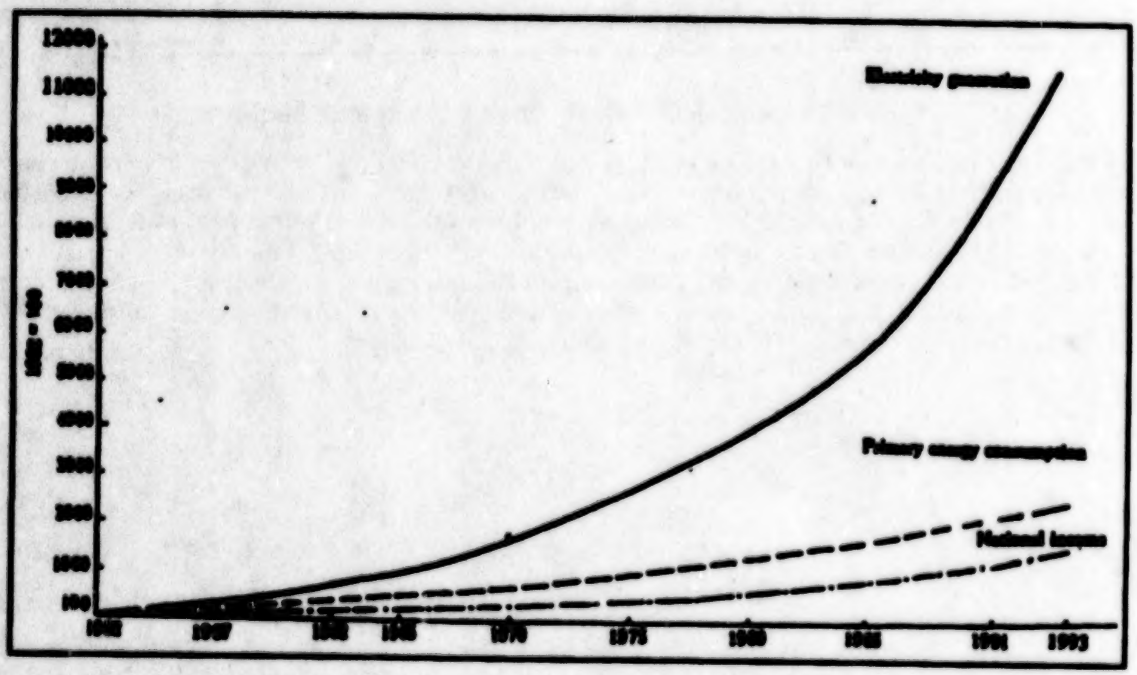


Figure 4. Energy Consumption and Economic Growth, 1952-1993

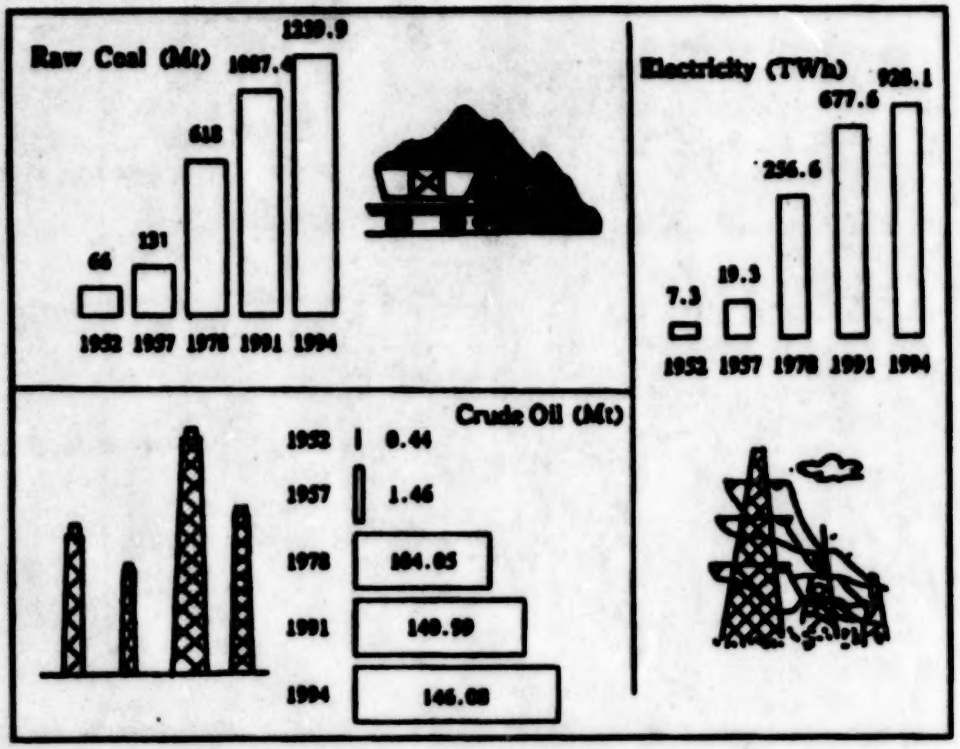


Figure 5. Energy Output, 1949-1994

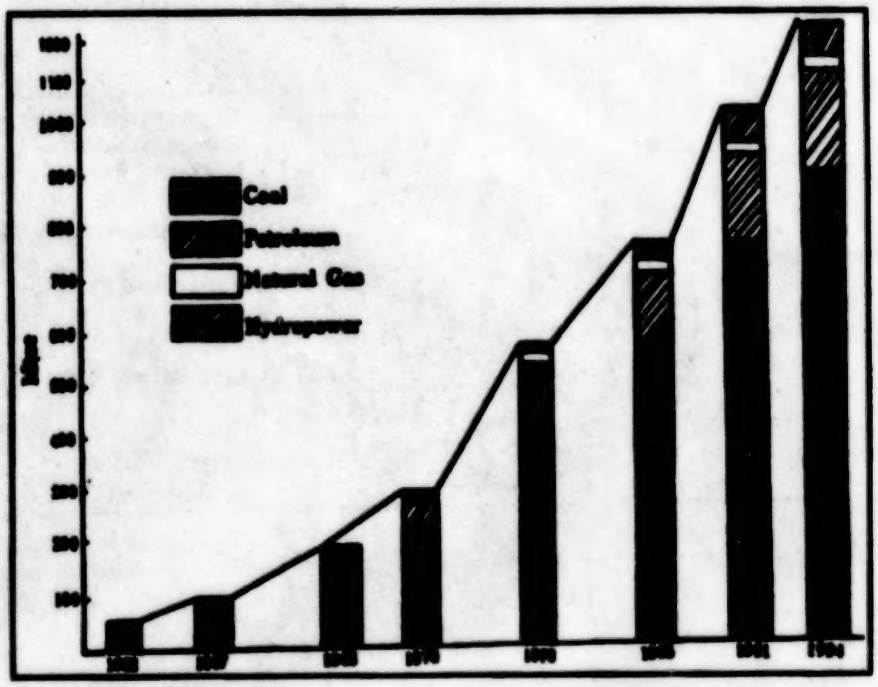


Figure 6. Primary Energy Consumption Mix, 1952-1994

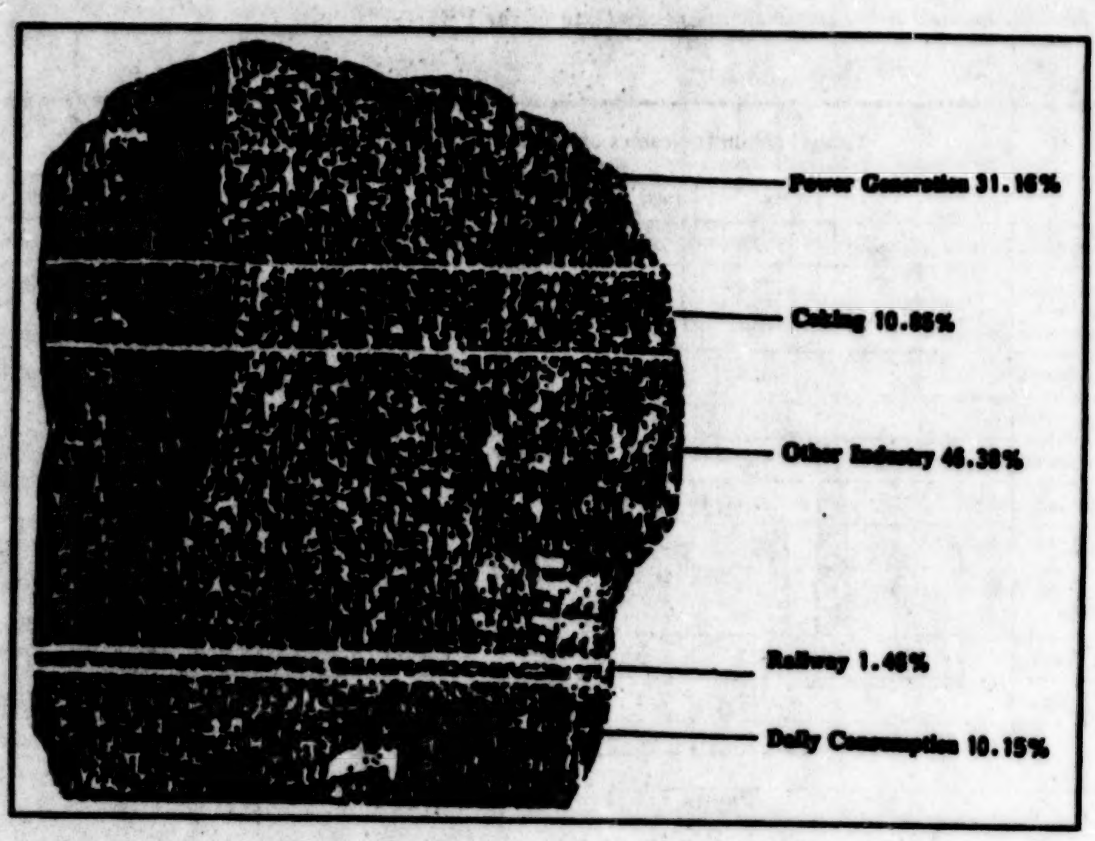


Figure 7. Coal Consumption by End-Use Sector, 1994

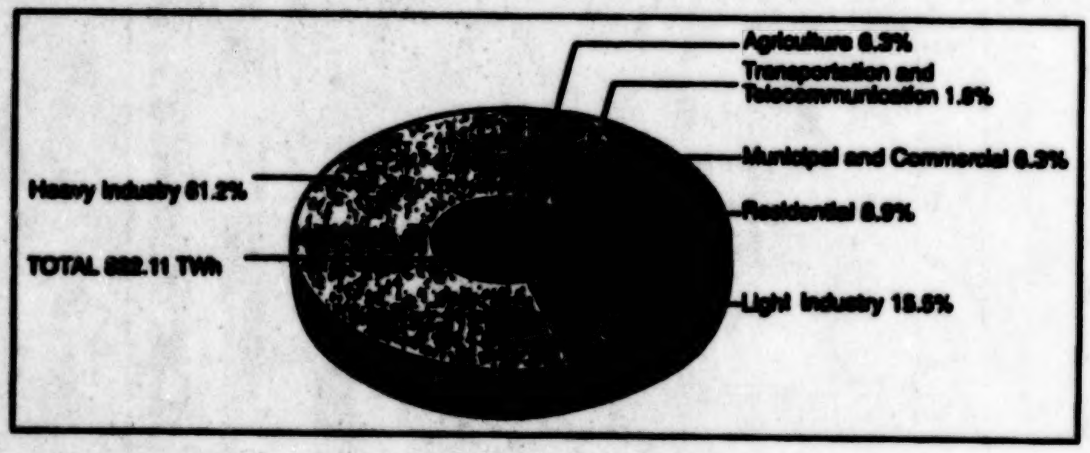


Figure 8. Power Consumption Mix, 1993

Energy Data of the PRC

Table 1. Main Indicators of National Economy (1978-1994)

	1978	1980	1985	1990	1992	1993	1994
1. Total population at year-end, million	962.59	987.05	1,058.51	1,143.33	1,171.71	1,185.17	1,198.50
Urban areas	172.45	191.40	250.94	301.91	323.72	333.51	343.01
Townships and villages	790.14	795.65	807.57	841.42	847.99	851.66	855.49
2. GNP, billion RMB	362.4	451.8	899.5	1,854.5	266.5	3,447.7	4,491.8
Primary industry, %	28.1	30.1	28.4	27.1	21.8	19.9	21.0
Secondary industry, %	48.2	48.5	43.1	1	43.9	46.7	47.3
Tertiary industry, %	23.7	21.4	28.5	31.3	34.3	32.5	31.8
3. GDP, billion RMB	362.4	451.8	896.4	1,853.1	2,663.5	3,451.5	4,500.6
4. Gross output value of industry, billion RMB	423.7	515.4	971.6	2,392.4	3,706.6	5,269.2	7,690.9
Light industry	182.6	243.0	457.5	1,181.3	1,749.2	2,318.4	3,622.4
Heavy industry	241.1	272.4	514.1	1,121.1	1,957.4	2,950.8	4,068.5
5. Total investment in fixed assets, billion RMB		91.1	254.3	444.9	785.5	1,245.8	1,637.03
6. Volume of freight traffic, billion t-km	982.9	1,202.6	1,812.6	2,620.7	2,921.8	3,051.0	3,326.1
7. Total value of imports and exports, billion U.S. dollars	20.6	38.1	69.6	115.4	165.5	195.7	236.73
Value of exports	9.8	18.1	27.4	62.1	84.9	91.7	121.04

Table 2. Increase Rate of Energy Consumption and National Income (1980-1994)

Year	Increase rate of energy consumption, %	Increase rate of electricity consumption, %	Increase rate of GDP, %	Elasticity of energy consumption	Elasticity of electricity consumption
1980	2.88	6.60	7.8	0.45	0.85
1981	-1.37	3.0	4.5		0.67
1982	4.41	6.9	8.5	0.52	0.71
1983	6.40	7.29	10.2	0.63	0.72
1984	7.37	7.36	15.2	0.49	0.49
1985	8.15	9.00	13.5	0.60	0.67
1986	5.44	9.45	8.8	0.61	1.08
1987	7.15	10.61	11.6	0.62	0.91
1988	7.35	9.67	11.3	0.65	0.86
1989	4.23	7.29	4.1	1.02	1.78
1990	1.82	6.22	3.8	0.47	1.63
1991	5.1	9.2	9.3	0.55	0.99
1992	5.2	11.5	14.2	0.37	0.81
1993	2.8	9.5	13.5	0.21	0.70
1994	6.0	10.5	11.8	0.51	0.89

Table 3. Energy Consumption Per RMB 10,000 of GDP (1980-1994)

Year	Total energy, tce	Coal, t	Coke, t	Petroleum, t	Crude oil, t	Fuel oil, t	Electricity, KWH
1980	7.64	13.52	0.95	1.94	2.04	0.68	6,605
1981	7.21	12.86	0.83	1.76	1.85	0.60	6,379
1982	6.92	12.52	0.78	1.60	1.70	0.55	6,221
1983	6.67	12.16	0.73	1.48	1.61	0.51	5,989
1984	6.25	11.58	0.68	1.34	1.42	0.44	5,387
1985	6.00	11.18	0.64	1.26	1.30	0.39	4,751
1986	5.84	10.88	0.66	1.23	1.29	0.38	4,572
1987	5.64	10.57	0.65	1.17	1.22	0.36	4,339
1988	5.44	10.21	0.62	1.14	1.15	0.33	3,807
1989	5.43	10.21	0.63	1.14	1.15	0.33	3,601
1990	5.32	9.90	0.65	1.08	1.10	0.32	3,465
1991	5.20						3,317
1992	4.80						3,104
1993	4.42						2,613
1994	4.18						2,065

Table 4. Energy Consumption for Major Industrial Products (1980-1993)

	1986	1988	1989	1990	1991	1992	1993
Comparable energy consumption for steel, kgce/t	1,746			1,611		1,574	1,545
Gross coal consumption for power generation, kgce/kWh	398	397	397	392	390	385	384
Full energy consumption for synthetic ammonia (coal, coke; medium-sized plant), kgce/t	2,236	2,212	2,193	2,176	2,151	2,155	2,089
Coal consumption for cement clinker, kg/t	201.1	191.2	188.2	185.4	184	178	177
Full energy consumption for railroad locomotive, kgce/10^4t x km	118.7	94.1	88.9	84.1	78.6		88.1

Table 5. Fixed Assets Investment in Energy Industry (1981-1993) (State-owned) (Unit: million RMB)

Year	Total	Coal mining and preparation	Petroleum and natural gas extraction	Electricity production and supply	Petroleum processing	Coking, gas coal products
1981	14,124	3,606	4,686	4,755	718	359
1982	17,336	4,818	6,199	5,516	689	114
1983	21,240	6,140	7,424	6,888	643	145
1984	27,767	8,109	9,460	8,841	983	374
1985	36,641	8,716	13,029	12,621	1,203	1,072
1986	43,396	9,254	13,782	18,137	1,623	1,600
1987	54,301	9,865	16,621	23,554	2,619	1,642
1988	64,502	10,668	19,689	28,140	4,095	1,910
1989	70,564	12,230	23,294	29,573	3,474	1,993
1990	84,674	16,446	23,113	27,223	4,547	3,344
1991	95,675	17,707	27,343	41,019	6,029	3,576
1992	116,410	19,420	32,675	53,621	6,699	3,995
1993	149,767	15,305	14,079	67,513	12,386	

Table 6. Proportion of Capital construction Investment in Energy Industry to Gross Capital Construction Investment (1980-1993) (Unit: %)

Year	Total	Coal industry	Petroleum industry	Electricity industry	Hydropower	Coking & coke chemical
1980	20.69	5.99	5.97	8.61	3.42	0.12
1981	21.37	5.23	6.31	9.06	3.29	0.77
1982	18.04	5.37	4.55	8.32	3.27	0.15
1983	21.48	6.74	4.89	9.67	4.23	0.18
1984	22.33	7.42	4.12	10.36	5.15	0.43
1985	19.11	5.13	3.09	10.19	4.66	0.70
1986	22.71	4.91	3.28	13.74	7.25	0.78
1987	25.32	4.44	4.36	15.70	7.94	0.82
1988	26.14	4.03	5.49	15.86	9.29	0.75
1989	28.77	4.54	6.03	17.26	9.86	0.94
1990	32.77	5.80	5.91	19.64	11.46	1.42
1991	30.54	5.51	5.95	17.85		1.23
1992	26.64	4.21	5.21	16.25		0.97
1993	22.95	3.23	5.00	14.63		

Table 7. Regional Distribution of Energy Resources

Region	Total	Coal	Water power	Petroleum, natural gas
North China	43.9	64.0	1.8	14.4
Northeast China	3.8	3.1	1.8	48.3
East China	6.0	6.5	4.4	18.2
Central South China	5.6	3.7	9.5	2.5
Southwest China	28.6	10.7	70.0	2.5
Northwest China	12.1	12.0	12.5	14.0

Table 8. Distribution of Exploitable Waterpower Resources

No.	Region/Province	Installed capacity (MW)	Annual output (10^8kWh)	Percentage
	Nationwide	378,532.4	19,233.04	100.0
I	North China	6,919.8	232.25	1.2
1	Beijing, Tianjin, Hebei	1,837.1	41.77	0.2
2	Shaanxi	2,639.8	106.98	0.6
3	Inner Mongolia	2,442.9	83.50	0.4
II	Northeast China	11,994.5	383.91	2.0
4	Liaoning	1,633.4	55.85	0.3
5	Jilin	4,329.2	109.55	0.6
6	Heilongjiang	6,031.9	218.51	1.1
III	East China	17,902.2	687.94	3.6
7	Shanghai, Jiangsu	97.5	3.10	0.02
8	Zhejiang	4,655.2	145.63	0.8
9	Anhui	881.5	26.09	0.1
10	Fujian	7,051.2	320.20	1.7
11	Jiangxi	5,108.6	190.54	1.0
12	Shandong	108.2	2.38	0.01
IV	Central South China	67,434.9	2,973.65	15.5
13	Henan	2,928.8	111.63	0.6
14	Hubei	33,094.7	1,493.84	7.8
15	Hunan	19,838.4	488.91	2.5
16	Guangdong	5,802.9	215.79	1.1
17	Guangxi	14,183.1	639.47	3.3
V	Southwest China	232,343.3	13,050.36	67.8
18	Sichuan	91,665.1	5,152.91	26.8
19	Guizhou	12,917.6	652.44	3.4
20	Yunnan	71,167.9	3,944.53	20.5
21	Tibet	56,592.7	3,300.48	17.2
VI	Northwest China	41,937.7	1,904.93	9.9
22	Shaanxi	5,507.1	217.04	1.1
23	Gansu	9,109.7	424.44	2.2
24	Qinghai	17,990.8	772.08	4.0
25	Ningxia	795.0	31.62	0.2
26	Xinjiang	8,535.1	459.75	2.4

Table 9. Primary Energy Output and Mix (1980-1994)

Year	Total output (Mtoe)	Percentage of each type of resource			
		Raw coal	Crude oil	Natural gas	Hydropower
1980	637.35	69.4	23.8	3.0	3.8
1981	632.27	70.2	22.9	2.7	4.2
1982	667.82	71.2	21.9	2.4	4.5
1983	712.70	71.6	21.3	2.3	4.8
1984	778.55	72.4	21.1	2.1	4.4
1985	855.46	72.8	20.9	2.0	4.3
1986	881.24	72.4	21.2	2.1	4.3
1987	912.66	72.6	21.0	2.0	4.4
1988	958.01	73.1	20.4	2.0	4.5
1989	1,016.38	74.1	19.3	2.0	4.6
1990	1,039.22	74.2	19.0	2.0	4.8
1991	1,048.44	74.1	19.2	2.0	4.7
1992	1,072.56	74.3	18.9	2.0	4.8
1993	1,112.63	73.8	18.6	2.0	5.6
1994	1,187.29	74.6	17.6	2.0	5.8

Table 10. Primary Energy Consumption and Mix (1980-1994)

Year	Total output (Mtoe)	Percentage of each type of resource			
		Coal	Petroleum	Natural gas	Hydropower
1980	602.75	72.15	20.76	3.10	3.99
1981	594.47	72.74	19.96	2.79	4.51
1982	620.67	73.67	18.91	2.56	4.86
1983	660.40	74.16	18.14	2.44	5.26
1984	709.04	75.27	17.45	2.37	4.91
1985	766.82	75.81	17.10	2.24	4.85
1986	808.50	75.83	17.20	2.26	4.71
1987	866.32	76.21	17.02	2.13	4.64
1988	929.97	76.17	17.05	2.06	4.72
1989	969.34	75.80	17.20	2.10	4.90
1990	987.08	76.20	16.60	2.10	5.10
1991	1,057.89	76.10	17.10	2.00	4.80
1992	1,091.70	75.7	17.5	1.9	4.9
1993	1,117.68	72.8	19.6	2.0	5.6
1994	1,127.37	75.0	17.4	1.9	5.7

Table 11. Overall Energy Supply and Consumption (Unit: 10,000 tce)

Item	1985	1990	1991	1992	1994
Total energy available for consumption	77,603	96,138	100,195	104,880	117,967
Primary energy output	85,546	103,922	104,844	107,256	118,729
Import	340	1,310	1,762	3,334	4,342
Export	5,774	5,875	5,735	5,633	5,772
Change in inventory	-2,509	-3,219	-852	-77	668
Total energy consumption	76,682	98,703	103,783	109,170	122,737
Consumption by sector					
I. Materials production sector	60,894	79,431	83,815	89,173	101,781
1. Farming, forestry, animal, husbandry	4,045	4,852	5,099	5,020	5,105
2. Industry	51,068	67,578	71,413	76,279	87,855
3. Construction	1,302	1,213	1,278	1,392	1,349
4. Transportation and telecommunications	3,713	4,541	4,756	5,058	5,625
5. Commerce, food, material supply and storage	766	1,247	1,269	1,424	1,847
II. Nonmaterial production sector	2,470	3,473	3,975	4,361	5,543
III. Personal or private consumption	13,318	15,799	15,993	15,636	15,413
Consumption by usage					
Final use	73,586	94,289	98,748	104,087	116,770
Industry	48,021	63,239	66,441	71,269	82,264
Losses in processing	1,491	2,264	2,690	2,533	2,761
Other losses	1,605	2,150	2,345	2,550	3,206
Balance	920	-2,565	-3,588	-4,290	-4,770

Table 12. Rural Energy Consumption in 1994 (Unit: Mtce)

	Household	Agriculture production	Total
Commercial energy			
Coal	93.50	169.3	262.8
Petroleum products	1.60	35.45	37.05
Electricity	15.25	52.35	67.6
Total	110.35	257.1	367.45
Noncommercial energy			
Firewood	93.50	16.8	110.3
Crop stalk	137.45		137.45
Total	230.95	16.8	247.75
Total	341.30	273.9	615.2

Table 13. Efficiency of Energy Conversion (Unit: %)

Year	Total efficiency	Electricity generation and heating supply by power stations	Coking	Petroleum refining
1983	69.93	36.94	91.18	99.16
1984	69.16	36.95	90.08	99.17
1985	68.29	36.85	90.79	99.10
1986	68.32	36.69	90.63	99.04
1987	67.48	36.75	90.46	98.81
1988	66.54	36.34	90.77	98.76
1989	66.51	36.74	90.30	98.57
1990	67.20	36.34	91.28	97.90
1991	65.90	37.60	89.90	98.10
1992	66.00	37.80	92.70	96.80

Table 14 Raw Coal Output by Type of Mine (1979~1994)

Unit: [illegible]

	1979	1980	[illegible]	1986	1987	[illegible]	[illegible]	1990	1991	1992	1993	1994
NATIONWIDE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1114.20	1154.37	1239.53
state controlled mines	357.77	344.30	[illegible]	413.95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
regional mines	277.77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
of which,												
provincial mines	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
prefectural mines	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
county mines	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
collectively and individually owned mines in towns & villages	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
others					[illegible]	6.75	[illegible]	[illegible]	[illegible]	3.71	[illegible]	[illegible]

Table 15. Coal Consumption Mix (1953-1994)

Year	Production and construction				Domestic	Total consumption
	Total	Power generation	Coking	Railway		
Consumption (Mt)						
1953	41.51	6.94	6.27	7.21	29.98	74.49
1957	70.56	12.23	13.73	9.34	54.13	124.69
1962	133.70	30.47	18.84	15.15	72.99	206.69
1965	153.84	38.49	20.38	15.65	75.00	228.84
1970	250.64	60.21	36.18	20.26	81.20	331.84
1975	363.63	79.32	52.48	28.88	93.50	457.13
1976	379.30	77.64	43.71	22.89	89.00	468.30
1977	418.87	90.31	50.18	24.86	96.27	515.14
1978	465.01	113.44	59.30	26.30	100.63	565.64
1979	479.16	118.80	61.78	25.19	106.00	585.16
1980	481.11	122.96	59.34	24.16	125.74	606.85
1981	471.76	123.81	53.58	23.33	133.89	605.65
1982	493.70	134.27	54.92	24.35	147.56	641.26
1983	522.87	143.11	57.87	25.14	151.98	674.85
1984	574.35	162.07	60.79	25.97	169.83	744.18
1985	622.29	174.96	63.52	26.24	191.87	814.16
1986	662.78	195.92	67.36	25.03	199.11	861.89
1987	712.18	221.96	70.66	23.91	208.22	920.40
1988	799.22	249.50	88.79	22.59	194.32	993.54
1989	845.06	275.37	96.31	22.84	189.21	1,034.27
1990	868.43	302.00	106.98	21.61	186.80	1,055.23
1991	939.8	301.19	108.61	20.25	164.52	1,104.32
1992	973.19	334.59	112.82	18.76	147.80	1,140.85
1994	1,154.85	400.53	139.48	18.73	130.47	1,285.32
Mix (%)						
1953	58.1	9.7	8.8	10.1	41.9	100
1957	56.6	9.8	11.0	7.5	43.4	100
1962	64.7	14.7	9.1	7.3	35.3	100
1965	67.2	16.8	8.9	6.8	32.8	100
1970	75.5	18.1	10.9	6.1	24.5	100
1975	79.6	17.3	11.5	5.2	20.4	100
1976	81.0	16.6	9.3	4.9	19.0	100
1977	81.3	17.5	9.7	4.8	18.7	100
1978	82.2	20.1	10.5	4.7	17.8	100

Year	Production and construction				Domestic	Total consumption
	Total	Power generation	Coking	Railway		
1979	81.9	20.3	10.6	4.3	18.1	100
1980	79.4	20.3	9.8	4.0	20.6	100
1981	77.9	20.4	8.8	3.8	22.1	100
1982	76.8	20.9	8.6	3.8	23.2	100
1983	77.5	21.2	8.6	3.7	22.5	100
1984	77.2	21.8	8.2	3.5	22.8	100
1985	76.4	21.5	7.8	3.2	23.6	100
1986	76.9	22.7	7.8	2.9	23.1	100
1987	77.4	24.1	7.8	2.6	22.6	100
1988	80.4	25.1	8.9	2.3	19.6	100
1989	81.7	26.6	9.3	2.2	18.3	100
1990	82.3	28.6	10.1	2.0	17.7	100
1991	85.11	27.27	9.84	1.83	14.89	100
1992	87.04	29.32	9.89	1.74	12.96	100
1994	89.85	31.16	10.85	1.46	10.15	100

Table 16. Oil-Gas Production Bases (1994)

No.	Name	Crude oil (1,000 t)	Natural gas ($10^8 m^3$)
1	Daqing	56,005	2,320
2	Shengli	30,902	1,307
3	Liaohe	15,023	1,752
4	Xinjiang	7,902	830
5	Zhongyuan	4,831	1,201
6	Huabei	4,640	303
7	Dagang	4,250	400
8	Jilin	3,301	186
9	Henan	2,051	39
10	Changqing	1,960	78
11	Qinhai	1,131	67
12	Jiangsu	920	23
13	Jianghan	870	78
14	Yunnan	1,846	90
15	Yanzhong	632	
16	Sichuan	156	7,067
17	South Sea, Bohai Sea	4633	

Table 17. Output of Main Petroleum Products (1970-1994) (Unit: Mt)

Date	Crude oil	Crude oil processed	Gasoline	Kerosene	Diesel oil	Lubricating oil	Light oil for chemicals	Export naphtha	Heavy oil
1970	30.65	27.65	4.59	2.03	6.22	0.78	-	0	8.77
1975	77.06	50.87	7.37	2.90	13.24	1.33	0.45	0	17.71
1976	87.16	57.17	8.17	3.03	14.93	1.28	0.46	0	20.15
1977	93.64	63.09	8.67	3.17	16.16	1.57	0.91	0	22.37
1978	104.05	70.69	9.91	3.56	18.26	1.81	1.04	0.04	24.70
1979	106.15	71.46	10.69	4.09	18.72	1.92	1.46	0.14	24.95
1980	105.95	75.38	10.79	3.98	18.28	1.97	2.05	0.60	28.85
1981	101.22	71.47	11.01	3.64	17.39	1.50	2.32	0.92	26.28
1982	102.12	72.07	11.00	3.81	17.11	1.40	2.72	1.32	26.10
1983	106.07	79.75	12.35	4.07	18.83	1.17	3.11	1.52	27.06
1984	114.61	81.79	13.31	4.05	19.30	1.30	3.24	1.64	26.79
1985	124.89	84.50	14.38	4.03	19.89	1.43	4.92	1.64	26.41
1986	131.08	91.59	16.47	4.05	21.99	1.50	3.83	1.20	26.63
1987	134.14	97.18	17.12	4.16	23.38	1.63	5.56	1.13	28.83
1988	137.03	101.61	18.66	5.35	24.40	1.83	7.02	1.18	28.17
1989	137.65	105.28	20.65	3.95	25.81	2.16	7.02	0.93	29.30
1990	138.31	107.23	21.57	3.90	26.09	2.09	7.84	0.54	-
1991	139.79	113.64	23.45	4.06	27.66	1.73	8.01	0.46	32.44
1992	142.03	104.61	23.87	3.88	30.05	2.75	8.17	0.27	31.54
1993	144.01	125.68	32.42	3.83	36.69	2.77	8.15	0.09	30.71
1994	146.08	140.30	35.02	-	40.16	2.78	-	-	-

Table 18. Electric Power Installed Capacity and Output (1980-1994)

Year	Installed capacity (MW)		Output (10^8kWh)	
	Total	of which: Hydropower	Total	of which: Hydropower
1980	65,870	20,320	3,006	582
1981	69,130	21,930	3,093	655
1982	72,360	22,960	3,277	744
1983	76,440	24,160	3,514	864
1984	80,120	25,600	3,770	868
1985	87,050	26,420	4,107	924
1986	93,819	27,542	4,496	945
1987	102,897	30,193	4,973	1,002
1988	115,497	32,698	5,451	1,092
1989	126,639	34,583	5,847	1,184
1990	137,890	36,046	6,213	1,246
1991	151,473	37,884	6,776	1,251
1992	166,532	40,681	7,541.9	1,314.7
1993	182,911	45,493	8,364.3	1,507.4
1994	199,897	49,061	9,278.0	1,667.9

Table 19. Power Networks With the Capacity Over GW (1994)

Power networks	Capacity (GW)			Electricity generation (TWh)		
	Total	Hydropower	Thermal power	Total	Hydropower	Thermal power
North China	29.86	1.27	28.59	153.29	2.51	150.78
Northeast China	25.17	4.40	20.77	115.16	9.48	105.67
East China	36.16	3.08	32.78	167.22	7.46	157.98
Central China	29.50	11.93	17.57	136.97	45.70	91.27
Fujian	5.38	3.36	2.02	22.88	10.78	12.10
Shandong	12.06	0.076	11.98	67.77	0.07	67.70
Guangdong	19.82	4.54	13.47	77.06	11.86	52.94
Guanxi	5.02	3.03	1.99	18.67	11.53	7.14
Sichuan	11.38	5.05	6.33	52.52	20.95	31.57
Guizhou	3.85	1.84	2.01	16.98	5.78	11.20
Yunnan	4.95	3.62	1.33	19.43	12.72	6.71
Northwest China	15.08	5.82	9.26	73.91	22.61	51.30

Table 20. Type of Fuel for Thermal Power Generation (1980-1994)

Year	Fuel				
	Coal (Mt)	Petroleum (Mt)	Natural gas (10^8m^3)	Total (Mtce)	Output (GWh)
1979	106.70	16.40	1,668.90	94.00	222,352
1980	109.71	16.26	2,076.73	96.86	234,286
1981	109.86	15.79	1,757.40	96.41	236,764
1982	117.06	15.20	2,169.58	99.69	246,898
1983	125.58	14.52	1,994.43	103.53	258,883
1984	140.77	13.82	2,825.26	113.01	283,955
1985	156.62	13.45	3,606.81	123.46	310,201
1986	192.53	13.50	5,468.35	137.46	355,091
1987	196.18	13.42	5,686.92	152.18	397,072
1988	223.92	14.31	4,246.58	167.99	435,888
1989	274.27	17.10	9,416.00	200.71	466,300
1990	291.00	15.45	9,664.89	211.99	494,900
1991	325.93	15.01	10,568.39	236.90	552,460
1992	327.20	11.89	6,409.14	232.78	622,723
1993	362.04	12.03	8,181.00	288.10	836,429
1994	392.91	11.64	8,532.00	308.63	927,878

Year	Average fuel consumption (kgce/kWh)	Average thermal energy consumption (MK/kWh)
1979	0.422	12.37
1980	0.413	12.10
1981	0.407	12.92
1982	0.404	11.83
1983	0.400	11.72
1984	0.398	11.66
1985	0.398	11.66
1986	0.398	11.66
1987	0.397	11.63
1988	0.397	11.63
1989	0.397	11.63
1990	0.392	11.48
1991	0.390	11.42
1992	0.386	11.30
1993	0.384	11.24
1994	0.381	11.15

Table 21. Main Indicators of Power Industry [Part I—1985-1989]

	1985	1986	1987	1988	1989
Capacity of power generating equipment by year end, GW	87.05	93.82	102.90	115.50	126.64
among which: hydropower	26.42	27.54	30.19	32.70	34.58
Power generation, TWh	410.7	449.6	497.3	545.1	584.7
among which: hydropower	92.4	94.5	100.2	109.2	118.4
Net coal consumption rate, g/kWh	431	432	432	431	432
Gross coal consumption rate, g/kWh	398	398	397	397	397
Plant use, %	6.42	6.54	6.67	6.69	6.81
among which: hydropower	0.28	0.28	0.31	0.34	0.30
thermal power	7.78	7.83	7.87	7.94	8.12
Line loss rate, %	8.18	8.15	8.48	8.18	8.02
Generating unit utilization hours	5,308	5,388	5,392	5,313	5,171
among which: hydropower	3,853	3,882	3,771	3,710	3,691
thermal power	5,893	5,974	6,011	5,907	5,716

[Continuation] Table 21. Main Indicators of Power Industry [Part II—1990-1994]

	1990	1991	1992	1993	1994
Capacity of power generating equipment by year end, GW	137.89	151.47	166.53	182.91	199.59
among which: hydropower	36.05	37.88	40.68	44.59	49.06
Power generation, TWh	621.32	677.55	754.19	836.43	927.88
among which: hydropower	126.35	125.09	131.47	150.74	166.79
Net coal consumption rate, g/kWh	427	424	420	417	414
Gross coal consumption rate, g/kWh	392	390	386	384	381
Plant use, %	6.90	6.94	7.00	6.96	6.90
among which: hydropower	0.3	0.32	0.37	0.41	0.42
thermal power	8.22	8.13	8.08	8.08	7.99
Line loss rate, %	8.06	8.15	8.29	8.52	8.73
Generating unit utilization hours	5,036	5,030	5,029	5,068	5,233
among which: hydropower	3,800	3,675	3,567	3,730	3,877
thermal power	5,413	5,451	5,462	5,455	5,574

Table 22. Power Consumption Mix (1980-1994) (Unit: 100 GWh)

Year	Municipal consumption	Industry	Transport	Rural	Miscellaneous	Total
1980	139.97	1,961.33	14.68	374.36	26.05	2,516.39
1981	158.66	1,975.30	16.46	415.63	23.71	2,589.76
1982	174.13	2,093.30	18.41	441.85	25.54	2,752.99
1983	206.18	2,248.87	21.88	475.27	19.06	2,971.26
1984	238.03	2,402.15	25.39	510.90	19.53	3,196.00
1985	286.28	2,570.84	31.32	573.32	21.87	3,483.53

[Continuation of Table 22]

	1986	1987	1988	1989	1990	1991	1992	1993	1994
Daily consumption	231.5	267.5	321.8	372.3	461.4	531.7	632.76	729.29	874.81
Industry	3,609.5	3,970.4	4,301.1	4,597.7	4,819.1	5,208.5	5,746.95	6,287.84	6,822.49
Agricultural	3[illegible]3	345.9	375.5	400.7	415.3	464.3	348.03	356.82	384.21
Geological exploration	2.[illegible]	3.4	3.8	4.1	4.6	5.3	6.00	6.62	8.13
Construction	32.4	40.1	43.5	44.6	45.3	52.7	63.08	81.59	96.49
Transportation and communication	66.9	76.8	86.7	96.3	104.8	115.8	132.95	151.27	167.54
Commercial	41.2	49.5	61.0	67.9	77.0	89.5	109.66	133.47	164.70
Miscellaneous	126.8	149.1	165.3	178.3	198.5	229.0	415.96	454.18	528.12
Total	4,429.1	4,902.7	5,358.7	5,761.9	6,120.6	6,696.8	7,455.39	8,201.08	9,046.49

Table 23. China's Energy Export (1980-1994) (Unit: Mt)

Year	Coal	Crude oil	Oil Products
1980	6.32	13.31	4.75
1981	6.57	13.75	5.09
1982	6.44	15.20	5.69
1983	6.55	15.19	5.73
1984	6.96	22.29	6.39
1985	7.77	30.03	6.27
1986	9.82	28.50	6.12
1987	13.53	27.23	5.71
1988	15.64	26.05	5.37
1989	15.34	24.39	6.67
1990	17.29	23.99	5.26
1991	20.10	22.60	4.82
1992	19.70	21.51	5.98
1993	19.81	19.43	4.56
1994	24.19	18.49	4.39

Tables of Energy Data of Taiwan Province, Hong Kong, and Macao

Table 1. 1984-1993 Total Energy Production, Taiwan

Year	Coal (10,000 Tn)	Natural gas (100,000,000 m^3)	Electric power (100,000,000 kWh)
1984	201.08	12.66	492.86
1985	185.79	11.25	525.53
1986	172.50	10.23	590.28
1987	149.92	10.57	655.14
1988	122.55	11.57	716.43
1989	78.44	11.58	802.63
1990	47.21	11.29	861.23
1991	40.26	9.28	946.10
1992	33.48	8.72	1,005.29
1993	32.81	8.26	1,099.11

Table 2. 1985-1992 Total Energy Supply, Taiwan

	1985	1988	1989	1990	1991	1992
Total supplied (100,000 kl oil equivalent)	395.1	513.9	524.0	578.3	579.1	633.9
Distribution of supplied (%)	100.00	100.00	100.00	100.00	100.00	100.00
Coal	21.74	26.21	24.22	23.60	23.40	25.44
Petroleum	52.49	53.29	56.53	54.88	53.47	52.93
Natural gas	3.36	2.71	2.68	3.89	5.63	5.10
Hydraulic power	4.35	2.97	3.17	3.51	2.36	3.27
Nuclear power	18.06	14.82	13.40	14.12	15.14	13.26

Table 3. 1985-1992 Total Energy Consumption, Taiwan (Unit: 100,000 kl oil equivalent)

	1985	1988	1989	1990	1991	1992
Total consumption	3,592	4,672	4,863	5,136	5,447	5,751
Distribution of consumption (%)	100.00	100.00	100.00	100.00	100.00	100.00
Transportation	12.35	13.11	14.10	14.46	14.53	15.80
Industry	61.94	61.30	59.58	58.75	58.25	57.47
Agriculture	3.40	3.04	2.86	2.83	2.58	2.38
Resident	11.26	11.17	11.54	11.55	11.74	11.70
Commerce	2.44	2.92	3.38	3.80	4.17	4.47
Other	6.23	6.18	6.36	6.49	6.58	6.14
Non-energy use	2.38	2.28	2.18	2.12	2.15	2.04
Per capita energy consumption	1,887.2	2,361.2	2,430.8	2,538.5	2,662.4	2,784.4

Table 4. 1984-1992 Electricity and Gas Consumption, Hong Kong

Year	Electricity (terajoules)					Gas (terajoules)		
	Domestic	Commercial	Industrial	Street lighting	Export to China	Domestic	Commercial	Industrial
1984	10,817	24,609	18,543	196	2,663	2,476	3,174	257
1985	11,519	26,793	18,819	208	3,780	4,036	3,669	273
1986	12,808	29,180	21,391	213	4,350	4,593	4,123	327
1987	14,022	32,403	23,979	222	4,904	5,254	4,930	399
1988	15,711	34,818	24,876	228	5,186	6,127	5,680	440
1989	17,075	38,097	25,178	239	6,371	6,943	6,218	510
1990	19,037	41,582	24,934	248	6,470	7,596	6,877	583
1991	20,586	45,245	25,051	259	11,019	8,133	7,404	701
1992	21,716	47,971	24,194	271	17,866	9,152	8,232	823
1993	24,092	53,131	22,309	278	16,201	9,657	8,652	889

Table 5. Energy Supply and Consumption of Macao (Unit: TJ)

Year	Import					Export			Gross internalcon-sumption
	Total energy	Gas oil and diesel	Fuel oil	Electricity	Gasoline	Total energy	Gas oil and diesel	Fuel oil	
1990	13,975	3,564	8,274	327	752	20	-	-	13,704
1991	14,029	4,073	7,781	350	760	22	-	-	14,597
1992	14,843	3,696	8,695	379	915	30	-	-	14,906
1993	16,522	3,626	10,198	451	1,010	45	-	-	16,455

Tables of World Energy Data

Table 1. World Primary Energy Consumption [Part I—1984-1989] (Unit: Million tonnes of oil equivalent)

	1984	1985	1986	1987	1988	1989
United States	1,737.1	1,739.0	1,743.4	1,811.4	1,902.0	1,927.8
Canada	184.9	184.4	189.5	194.8	207.9	211.0
Denmark	16.7	18.4	18.8	18.1	18.0	16.5
France	189.7	193.8	201.0	204.2	204.5	215.2
Germany	343.6	354.5	355.0	355.6	356.6	349.0
Britain	194.7	203.3	208.5	208.2	211.3	212.5
FSU	1,241.1	1,290.3	1,313.5	1,350.1	1,375.7	1,370.6
Russia	—	804.5	818.1	847.8	862.2	866.5
China	493.0	526.5	554.6	575.8	600.6	640.2
Japan	360.6	360.7	364.5	372.5	392.7	408.0
World total	6,754.6	6,928.1	7,101.3	7,333.8	7,586.2	7,748.6

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 1. World Primary Energy Consumption [Part II—1990-1994]
(Unit: Million tonnes of oil equivalent)

	1990	1991	1992	1993	1994
United States	1,950.7	1,923.3	1,954.2	1,993.3	2,028.6
Canada	202.1	205.4	209.2	214.2	222.5
Denmark	16.8	19.3	17.7	18.9	20.6
France	225.9	233.0	234.2	235.2	232.0
Germany	351.5	342.2	337.9	335.1	332.2
Britain	213.4	217.6	217.0	219.0	217.8
FSU	1,399.2	1,348.9	1,248.7	1,118.2	1,001.3
Russia	853.3	842.3	800.4	735.8	664.6
China	650.6	646.1	681.1	709.5	748.7
Japan	428.1	443.2	450.7	455.7	478.5
World total	7,845.6	7,829.1	7,848.2	7,854.7	7,923.8

Table 2. World Primary Energy Consumption by Fuel [Part I—1993] (Unit: Million tonnes of oil equivalent)

Country	Petroleum	Natural gas	Coal	Nuclear power	Hydropower	Total
United States	789.3	525.2	489.7	165.7	23.3	1,993.3
Canada	77.0	61.6	23.7	24.2	27.7	214.2
Denmark	9.5	2.2	7.2	-	-	18.9
France	91.1	29.0	14.2	95.0	5.8	235.2
Germany	136.3	59.8	97.9	39.6	1.5	335.1
Britain	84.1	57.9	53.5	23.1	0.5	219.0
FSU	272.0	534.3	238.0	53.4	20.5	1,118.2
Russia	188.6	360.7	140.8	30.7	15.1	735.8
China	140.5	14.6	541.6	0.4	12.4	709.5
Japan	252.7	50.7	79.2	64.6	8.7	455.7
World total	3,120.6	1,827.1	2,142.9	563.6	201.0	7,854.7

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 2. World Primary Energy Consumption by Fuel [Part II—1994]
(Unit: Million tonnes of oil equivalent)

Country	Petroleum	Natural gas	Coal	Nuclear power	Hydropowe	Total
United States	807.9	533.2	492.5	173.6	21.4	2,028.6
Canada	79.5	63.5	24.9	27.8	26.8	222.5
Denmark	10.1	2.5	8.0	-	-	20.6
France	90.5	27.7	14.1	92.8	6.9	232.0
Germany	135.1	61.1	96.3	39.0	1.6	333.2
Britain	83.1	60.9	50.2	22.9	0.6	217.8
FSU	231.8	493.5	210.3	45.20	20.8	1,001.3
Russia	162.7	335.0	126.5	25.3	15.2	664.6
China	144.1	14.9	572.0	3.1	14.5	748.7
Japan	268.7	54.3	82.0	67.3	6.3	478.5
World total	3,172.4	1,824.2	2,153.2	573.1	201.0	7,923.8

Table 3. World Proved Oil Reserves at End of 1994 (Unit: Thousand million tonnes)

Country/region	Reserves
United States	3.8
Canada	0.9
Western Europe	2.2
FSU	7.8
Russia	6.7
Abu Dhabi	11.9
Iran	12.2
Iraq	13.4
Kuwait	13.3
Saudi Arabia	35.7
China	3.3
World total	137.3

Source: 1995 BP statistical Review of World Energy

Table 4. World Oil Production [Part I—1984-1989] (Unit: million tonnes)

Country/region	1984	1985	1986	1987	1988	1989
United States	496.7	499.3	482.9	467.8	459.6	420.5
Canada	83.5	85.3	85.3	89.9	94.6	92.1
Western Europe	182.7	189.9	195.1	199.9	199.3	194.5
FSU	612.7	596.7	615.1	625.2	623.7	609.9
Russia	—	542.3	560.9	569.5	568.8	554.9
Iran	102.2	110.2	103.3	115.7	116.3	142.3
Iraq	60.3	69.2	92.7	116.7	136.0	138.5
Kuwait	60.9	55.6	67.3	52.3	73.5	77.7
Saudi Arabia	219.4	173.8	253.6	222.6	278.7	273.2
China	114.6	124.9	130.7	134.1	137.1	137.6
World total	2,812.3	2,795.6	2,944.2	2,946.6	3,079.5	3,113.9

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 4. World Oil Production [Part II—1990-1994] (Unit: million tonnes)

Country/region	1990	1991	1992	1993	1994
United States	417.1	423.4	413.5	397.5	386.3
Canada	92.3	92.7	96.6	101.7	106.2
Western Europe	202.1	214.6	230.9	243.2	286.7
FSU	570.7	515.9	451.3	402.3	361.8
Russia	516.0	462.0	399.0	354.0	316.0
Iran	161.4	173.4	174.7	177.8	178.0
Iraq	105.1	13.7	25.9	22.1	24.5
Kuwait	62.1	9.9	54.7	96.0	103.7
Saudi Arabia	345.9	431.0	444.6	433.3	427.5
China	138.3	141.0	142.0	144.0	144.9
World total	3,187.2	3,164.7	3,189.8	3,179.0	3,209.1

Table 5. World Oil Consumption [Part I—1984-1989] (Unit: Million tonnes)

Country/region	1984	1985	1986	1987	1988	1989
United States	723.3	720.2	749.3	764.8	796.7	795.3
Canada	66.7	68.5	71.0	73.1	76.8	80.3
Denmark	10.4	10.7	10.5	9.6	9.5	9.2
France	85.9	94.3	86.0	86.0	86.0	88.4
Germany	122.5	12[illegible]3	133.3	129.5	129.4	121.6
Britain	89.6	77.4	77.4	75.2	80.0	81.7
FSU	417.0	416.5	418.2	420.2	414.6	413.4
Russia	—	244.5	247.6	249.8	248.0	252.8
China	86.5	90.3	100.0	105.3	110.2	112.3
Japan	217.9	206.7	298.5	209.2	244.7	232.9
World total	2,807.4	2,802.9	2,888.9	2,945.2	3,034.5	3,084.3

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 5. World Oil Consumption [Part II—1990-1994] (Unit: Million tonnes)

Country/region	1990	1991	1992	1993	1994
United States	781.8	765.6	782.2	789.3	807.9
Canada	77.7	74.8	74.9	77.0	79.5
Denmark	9.0	9.1	9.0	9.5	10.1
France	89.4	94.6	94.4	91.1	90.5
Germany	127.3	133.1	134.3	136.3	135.1
Britain	82.9	82.7	83.7	84.1	83.1
FSU	420.1	397.6	343.0	272.0	231.8
Russia	249.7	243.4	224.4	188.6	162.7
China	110.3	117.9	129.0	140.4	144.1
Japan	247.7	252.1	258.5	252.7	268.7
World total	3,136.9	3,129.4	3,152.5	3,120.6	3,172.4

Table 6. World Spot Crude Oil Price (Unit: U.S. dollars per barrel)

	Arabian light/Dubai* ($/bbl)	Fortie/Brent** ($/bbl)	Nigeria light ($/bbl)	West Texas Intermediate*** ($/bbl)
1972	1.90	-	-	-
1973	2.83	-	-	-
1974	10.41	-	-	-
1975	10.70	-	-	-
1976	11.63	12.80	-	12.23
1977	12.38	13.92	-	14.22
1978	13.03	14.02	-	14.55
1979	29.75	31.61	32.00	25.08
1980	35.69	36.83	37.18	37.96
1981	34.32	35.93	36.67	36.08
1982	31.80	32.97	33.75	33.65
1983	208.78	29.55	30.01	30.30
1984	28.07	28.66	28.96	29.34
1985	27.53	27.51	27.74	27.99
1986	12.97	14.38	14.60	15.05
1987	16.92	18.43	18.46	19.19
1988	13.22	14.96	15.10	15.98
1989	15.69	18.20	18.50	19.68
1990	20.50	23.81	24.27	24.52
1991	16.56	20.05	20.50	21.54
1992	17.21	19.37	19.92	20.57
1993	14.90	17.07	17.60	18.45
1994	14.76	15.98	16.21	17.21

Source: Platt's; Notes: *: 1972-Nov 1986 Arabian light; Dec 1986-1994 Dubai; **: 1976-1984 Fortie; 1985-1994 Brent; ***: 1976-1983 Posted WTI prices; 1984-1994 Spot WTI prices

Source: 1995 BP Statistical Review of World Energy

Table 7. World Oil Refinery Capacities [Part I—1984-1989] (Unit: 10^3 barrels daily)

Country/region	1984	1985	1986	1987	1988	1989
United States	15,660	15,460	15,565	15,915	15,655	15,570
Canada	2,015	2,075	2,080	1,870	1,855	1,850
France	2,190	2,175	2,040	1,900	1,810	1,700
Germany	2,650	2,285	2,215	2,180	2,170	2,020
Western Europe	15,725	15,005	14,690	14,555	14,360	13,985
Eastern Europe	14,435	14,435	14,790	14,820	14,915	15,275
Middle East	3,515	3,810	3,850	4,150	4,340	4,455
China	2,150	2,150	2,170	2,230	2,340	2,470
Japan	4,975	4,975	4,705	4,565	4,365	4,200
World total	74,370	72,995	73,045	73,580	73,490	74,025

[Continuation] Table 7. World Oil Refinery Capacities [Part II—1990-1994] (Unit: 10^3 barrels daily)

Country	1990	1991	1992	1993	1994
United States	15,675	15,695	15,120	15,035	15,240
Canada	1,880	1,905	1,950	1,860	1,860
France	1,700	1,700	1,715	1,685	1,695
Germany	2,025	2,210	2,225	2,250	2,270
Western Europe	13,970	14,175	14,270	14,200	14,370
Eastern Europe	15,275	15,255	12,860	12,825	12,850
Middle East	5,025	4,355	4,840	4,955	5,270
China	2,890	2,890	3,050	3,335	3,415
Japan	4,385	4,610	4,740	4,810	4,845
World total	75,510	75,590	73,965	74,615	75,495

Table 8. World Oil Refinery Throughputs [Part I—1984-1989] (Unit: 10^3 barrels daily)

Country/region	1984	1985	1986	1987	1988	1989
United States	12,045	12,000	12,715	12,855	13,245	13,400
Canada	1,435	1,395	1,380	1,440	1,530	1,560
Mexico	1,270	1,295	1,305	1,355	1,360	1,420
South, Central America	4,575	4,285	4,310	4,410	4,640	4,745
Western Europe	10,270	9,960	10,520	10,395	10,740	11,615
Eastern Europe	12,005	11,725	11,990	12,030	12,070	11,950
Middle East	3,320	3,665	3,765	3,935	4,265	4,350
Africa	1,795	1,850	1,920	2,000	2,100	2,185
Australasia	615	580	580	645	680	700
China	1,765	1,785	1,865	1,950	2,035	2,110
Japan	3,355	3,120	2,990	2,910	2,990	3,175
South Asia	885	1,020	1,120	1,150	1,150	1,230
Other Asia	2,485	2,685	2,800	2,785	3,170	3,410
World total	55,820	55,365	57,260	57,860	59,975	61,850

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 8. World Oil Refinery Throughputs [Part II—1990-1994] (Unit: 10^3 barrels daily)

Country/region	1990	1991	1992	1993	1994
United States	13,410	13,300	13,410	13,615	13,870
Canada	1,600	1,535	1,485	1,550	1,570
Mexico	1,490	1,510	1,495	1,540	1,605
South, Central America	4,800	4,665	4,735	4,835	4,915
Western Europe	11,905	12,535	12,905	13,060	13,015
Eastern Europe	11,235	10,085	8,240	7,060	6,170
Middle East	4,340	3,800	4,325	4,825	5,155
Africa	2,355	2,360	2,355	2,330	2,410
Australasia	715	745	745	755	790
China	2,155	2,280	2,450	2,570	2,525
Japan	3,435	3,655	3,880	3,980	4,165
South Asia	1,235	1,215	1,280	1,285	1,345
Other Asia	3,645	4,040	4,435	4,760	4,980
World total	62,320	61,725	61,740	62,165	62,515

Table 9. World Oil Import and Export [Part I—1984-1989] (Unit: 10^3 barrels daily)

	1984	1985	1986	1987	1988	1989
Imports						
United States	5,380	5,065	6,045	6,245	7,240	8,019
Western Europe	8,970	8,768	9,282	8,283	9,487	9,752
Japan	4,305	4,045	4,140	4,125	4,412	4,549
Rest of world	6,438	6,610	7,180	6,270	7,062	8,270
Total world	25,093	24,488	26,647	24,923	28,201	30,590
Exports						
United States	720	780	765	745	845	817
Canada	655	685	675	630	890	944
Mexico	1,635	1,580	1,405	1,440	1,427	1,361
South, Central America	2,465	1,985	2,195	1,595	1,819	2,150
Eastern Europe	2,643	2,549	2,711	2,589	3,510	3,201
Middle East	9,845	9,340	10,880	10,315	11,842	13,389
North Africa	2,290	2,415	2,515	2,435	2,598	2,415
West Africa	1,670	1,765	1,980	1,880	2,022	2,319
Asia, Australasia	2,220	2,339	2,301	2,064	2,006	2,353
Rest of world	950	1,050	1,220	1,230	1,242	1,641
Total world	25,093	24,488	26,647	24,923	28,201	30,590

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 9. World Oil Import and Export [Part II—1990-1994] (Unit: 10^3 barrels daily)

	1990	1991	1992	1993	1994
Imports					
United States	8,026	7,791	7,888	8,620	8,920
Western Europe	9,801	10,171	10,319	10,399	9,840
Japan	4,802	4,925	5,306	5,307	5,612
Rest of world	8,812	9,451	9,473	10,255	11,146
Total world	31,441	32,338	32,986	34,581	35,527
Exports					
United States	889	1,000	918	959	943
Canada	955	1,111	1,101	1,215	1,323
Mexico	1,387	1,468	1,469	1,434	1,421
South, Central America	2,367	1,953	2,374	2,391	2,695
Eastern Europe	2,659	1,860	1,887	2,072	2,136
Middle East	14,212	13,829	15,453	16,456	16,513
North Africa	2,604	2,781	2,849	2,685	2,652
West Africa	2,248	2,500	2,679	2,676	2,675
Asia, Australasia	2,182	2,257	2,414	2,420	2,517
Rest of world	1,938	3,579	1,842	2,273	2,652
World total	31,441	32,338	32,986	34,581	35,527

Table 10. Composition of Oil Import and Export 1994

Country/region	Million tonnes				Thousand barrels daily			
	Crude imports	Productim-ports	Crude exports	Productex-ports	Crude imports	Productim-ports	Crude exports	Productex-ports
United States	349.9	91.0	5.2	40.1	7,027	1,902	104	838
Canada	30.5	7.1	51.2	14.1	613	148	1,028	295
Mexico	—	8.5	66.3	4.3	—	178	1,331	90
South, Central America	60.0	10.5	83.6	48.6	1,205	219	1,679	1,016
Western Europe	404.2	82.4	53.8	35.0	8,117	1,722	1,080	732
Eastern Europe	26.1	9.6	71.3	33.7	524	201	1,432	704
Middle East	6.0	2.4	718.5	99.7	120	50	14,429	2,084
North Africa	6.7	5.1	100.6	30.2	135	107	2,020	631
West Africa	1.8	5.5	130.6	2.5	36	115	2,623	52
East, South Africa	19.2	4.2	—	0.2	386	88	—	4

Country/region	Million tonnes				Thousand barrels daily			
	Crude imports	Productim-ports	Crude exports	Productex-ports	Crude imports	Productim-ports	Crude exports	Productex-ports
Australia	18.8	2.7	7.1	5.0	378	56	143	105
China	12.3	14.4	19.7	2.7	247	301	396	56
Japan	232.4	45.2	—	6.6	4,667	945	—	138
South Asia	35.4	23.7	0.3	1.6	711	495	6	33
Other Asia	166.3	59.7	53.2	34.0	3,340	1,248	1,068	711
Unidentified	6.0	6.0	14.2	19.7	120	125	285	412
World total	1,375.6	378.0	1,375.6	378.0	27,625	7,902	27,625	7,902

Source: 1995 BP Statistical Review of World Energy

Table 11. World Gas Proved Reserves and R/P Ratios at End of 1994 (Unit: Trillion m^3)

United States	4.6	8.6
Canada	2.2	16.6
Western Europe	5.4	24.7
Eastern Europe	56.7	76.9
Russia	48.1	80.5
Abu Dhabi	5.3	*
Iran	21.0	*
Iraq	3.1	*
Kuwait	1.5	*
Saudi Arabia	5.3	*
Middle East	45.2	*
China	1.7	*
Asia, Australasia	9.9	49.7
World total	141.0	66.4

Source: 1995 BP Statistical Review of World Energy

*: Over 100 Years

Table 12. World Gas Production [Part I—1984-1989] (Unit: Million tonnes of oil equivalent)

Country/region	1984	1985	1986	1987	1988	1989
United States	453.8	427.9	416.9	413.9	443.5	449.8
Canada	64.4	68.9	64.3	70.7	81.7	87.0
Western Europe	156.6	159.4	154.8	161.1	152.2	157.9
Eastern Europe	537.4	583.9	619.9	653.1	688.1	706.4
Russia	—	387.9	422.3	457.0	459.2	517.0
Abu Dhabi	7.9	8.7	9.1	9.5	9.8	12.2
Iran	12.2	13.1	13.7	14.4	18.0	20.0
Saudi Arabia	16.4	16.9	22.7	24.1	26.2	26.8
Middle East	53.0	57.1	68.5	73.7	84.0	92.0
Africa	38.4	43.3	44.6	49.4	52.8	58.0
China	10.6	10.8	11.5	11.6	11.9	12.6
Asia, Australasia	88.1	94.5	108.4	112.2	120.2	125.9
World total	1,460.8	1,503.2	1,545.9	1,620.7	1,695.4	1,751.9

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 12. World Gas Production [Part II—1990-1994] (Unit: Million tonnes of oil equivalent)

Country/region	1990	1991	1992	1993	1994
United States	462.8	459.4	463.1	472.2	487.9
Canada	89.4	94.8	104.5	112.9	121.7
Western Europe	160.0	171.8	175.2	184.7	188.8
Eastern Europe	716.4	709.7	681.8	665.6	628.5
Russia	538.2	539.8	537.6	518.8	509.6
Abu Dhabi	11.9	14.9	12.7	12.9	13.3
Iran	21.8	23.2	22.5	24.4	27.9
Saudi Arabia	27.5	28.8	30.6	32.3	33.9
Middle East	89.3	91.2	98.9	107.6	114.6
Africa	59.9	64.6	67.4	68.4	66.4
China	12.8	13.4	13.6	14.6	14.9
Asia, Australasia	135.2	148.0	158.4	167.2	179.7
World total	1,790	1,817.7	1,827.3	1,862.6	1,873.8

Table 13. World Natural Gas Consumption [Part I—1984-1989] (Unit: Million tonnes of oil equivalent)

Country/region	1984	1985	1986	1987	1988	1989
United States	466.4	449.4	421.1	447.2	467.5	488.5
Canada	47.8	44.8	40.9	41.2	52.8	57.5
France	23.5	23.3	24.2	25.0	23.6	24.4
Germany	49.8	49.2	49.0	53.2	52.3	53.6
Britain	43.4	46.6	47.4	48.7	46.4	45.8
Western Europe	192.9	198.4	201.7	214.5	210.6	220.8
Russia	—	325.1	328.9	347.8	367.1	372.5
Eastern Europe	514.6	556.8	575.0	600.9	628.6	641.3
Middle East	50.4	54.4	65.9	71.2	81.1	89.2
China	10.8	11.5	12.1	12.8	12.7	12.9
Japan	33.6	35.9	36.7	38.0	40.3	43.1
Asia, Australasia	90.5	97.5	105.9	113.3	119.7	132.7
World total	1,450.5	1,491.5	1,503.5	1,581.9	1,660.5	1,734.4

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 13. World Natural Gas Consumption [Part II—1990-1994] (Unit: Million tonnes of oil equivalent)

Country/region	1990	1991	1992	1993	1994
United States	486.3	494.1	507.3	525.2	533.2
Canada	55.6	56.7	60.2	61.6	63.5
France	26.4	27.5	28.3	29.0	27.7
Germany	53.9	56.6	56.7	59.8	61.1
Britain	47.3	51.0	51.2	57.9	60.9
Western Europe	228.4	243.1	244.1	258.8	263.2
Russia	378.1	388.0	375.5	360.7	335.0
Eastern Europe	662.1	656.8	616.7	586.6	544.5
Middle East	85.1	85.3	95.7	104.1	110.7
China	13.2	13.4	13.6	14.6	14.9
Japan	46.1	49.2	50.4	50.7	54.3
Asia, Australasia	142.6	152.4	161.7	170.8	184.3
World total	1,767.8	1,799.1	1,798.7	1,827.1	1,824.2

Table 14 World Natural Gas Trade Movements 1994

From

Unit: Billion m^3

	USA	Canada	Mexico	Bolivia	Denmark	Germany	Netherlands	Norway	UK	FSU	Algeria	Malaysia	Japan
North America													
USA	-	78.5	6.3	-	-	-	-	-	-	-	-	-	78.8
Canada	1.1	-	-	-	-	-	-	-	-	-	-	-	1.1
Mexico	6.6	-	-	-	-	-	-	-	-	-	-	-	6.6
S & Cen. America													
Argentina	-	-	-	2.0	-	-	-	-	-	-	-	-	2.0
Western Europe													
Austria	-	-	-	-	-	0.3	-	0.3	-	5.1	-	-	5.6
Belgium	-	-	-	-	-	-	5.3	2.6	-	-	-	-	7.9
Finland	-	-	-	-	-	-	-	-	-	3.2	-	-	3.2
France	-	-	-	-	-	-	5.1	6.9	-	11.5	-	-	23.5
Germany	-	-	-	-	8.9	-	20.5	9.9	0.6	28.7	-	-	68.6
Italy	-	-	-	-	-	-	4.5	-	-	15.4	11.5	-	29.4
Luxembourg	-	-	-	-	-	-	0.6	-	-	-	-	-	0.6
Netherlands	-	-	-	-	-	-	-	2.8	0.3	-	-	-	3.1
Spain	-	-	-	-	-	-	-	1.0	-	-	-	-	1.0
Sweden	-	-	-	-	0.8	-	-	-	-	-	-	-	0.8
Switzerland	-	-	-	-	-	1.3	0.6	-	-	0.4	-	-	2.3
Turkey	-	-	-	-	-	-	-	-	-	5.0	-	-	5.0
United Kingdom	-	-	-	-	-	-	-	3.1	-	-	-	-	3.1
Eastern Europe													
Bulgaria	-	-	-	-	-	-	-	-	-	5.0	-	-	5.0
Czech & Slovak	-	-	-	-	-	-	-	-	-	13.0	-	-	13.0
Hungary	-	-	-	-	-	-	-	-	-	5.5	-	-	5.5
Poland	-	-	-	-	-	-	-	-	-	5.0	-	-	5.0
Romania	-	-	-	-	-	-	-	-	-	4.4	-	-	4.4
Other	-	-	-	-	-	-	-	-	-	2.9	0.3	-	3.2
Africa													
Tunisia	-	-	-	-	-	-	-	-	-	-	1.7	-	1.7
Asia													
Singapore	-	-	-	-	-	-	-	-	-	-	-	1.5	1.5
TOTAL EXPORTS	1.8	78.5	6.3	2.0	1.7	1.5	40.5	28.6	0.9	108.9	13.5	1.5	285.7

Source: OPEC Statistical Bureau of World Energy

Table 15. World LNG Trade 1994 (Unit: Billion m³)

LNG* Trade	From								
Country/region	United States	Abu Dhabi	Algeria	Libya	Australia	Brunei	Indonesia	Malaysia	Total imports
North America									
United States	-	-	1.5	-	-	-	-	-	1.5
Western Europe									
Belgium	-	-	4.0	-	-	-	-	-	4.0
France	-	-	7.7	-	-	-	-	-	7.7
Italy	-	-	0.1	0.1	-	-	-	-	0.2
Spain	-	-	4.6	1.4	0.5	-	-	-	6.4
Turkey	-	-	0.4	-	-	-	-	-	0.4
United Kingdom	-	-	**	-	-	-	-	-	**
Asia									
Japan	1.6	4.3	**	-	8.1	7.4	24.9	10.6	56.8
South Korea	-	-	-	-	-	0.4	7.2	0.4	7.9
Taiwan	-	-	-	-	-	-	3.0	-	3.0
Total exports	1.6	4.3	18.2	1.5	8.5	7.7	35.1	11.0	87.8

*: LNG (Liquefied natural gas); **: Less than 0.05; Source:: Cedigaz

Source: 1995 BP Statistical Review of World Energy

Table 16. World LNG and Natural Gas Price (Unit: U.S.$/million BTU)

Year	LNG	Natural gas			Crude oil
	Japan cif	European Union cif	United States (Wellhead)	United States (Imports)	IEA countries cif
1984	5.1	3.8	2.6	4.1	5.0
1985	5.2	3.8	2.4	3.2	4.8
1986	4.1	3.7	1.9	2.5	2.6
1987	3.5	2.6	1.6	2.2	3.1
1988	3.3	2.4	1.6	2.0	2.6
1989	3.4	2.1	1.6	2.0	3.0
1990	3.8	2.8	1.7	2.0	3.8
1991	4.1	3.2	1.6	2.0	3.3
1992	3.7	2.8	1.7	1.9	3.2
1993	3.7	2.5	2.0	2.0	2.8
1994	3.2*	2.4**	1.8	1.6	2.7

Notes: cif = cost + insurance + freight (average prices); *: Estimate based on Q1-Q3 prices; **: Estimate based on information supplied by Gas Strategies; Source of other data: IEA

Source: 1995 BP Statistical Review of World Energy

Table 17. World Coal Proved Reserves and R/P Ratios (Unit: Million tonnes)

	Anthracite and bituminous	subbituminous and lignite	Total	Share of total (%)	R/P ratio
United States	106,495	134,063	240,558	23.1	
Canada	4,509	4,114	8,623	0.8	
Mexico	860	351	1,211	0.1	
Total North America	111,864	138,528	250,392	24.0	247
Brazil	—	2,845	2,845	0.3	
Colombia	4,240	299	4,539	0.4	
Venezuela	417	—	417	•	
Other South, Central America	992	1,404	2,396	0.2	
Total South, Central America	5,649	4,548	10,197	0.9	298
France	113	26	139	•	
Germany	23,919	56,150	80,069	7.7	
Greece	—	3,000	3,000	0.3	
Turkey	162	6,986	7,148	0.7	
United Kingdom	2,000	500	2,500	0.2	
Other Western Europe	1,364	914	2,278	0.2	
Total Western Europe	27,558	67,576	95,134	9.1	209
Former Soviet Union	104,000	137,000	241,000	23.1	
Poland	29,100	13,000	42,100	4.0	
Other Eastern Europe	2,322	29,908	32,230	3.1	
Total Eastern Europe	135,422	179,908	315,330	30.2	352
South Africa	55,333	—	55,333	5.3	
Zimbabwe	734	—	734	0.1	
Other Africa	4,794	268	5,062	0.5	300
Australia	45,340	45,600	90,940	8.7	
China	62,200	52,300	114,500	11.0	
India	68,047	1,900	69,947	6.7	
Indonesia	962	31,101	32,063	3.1	
Japan	804	17	821	0.1	
New Zealand	27	90	117	•	
South Korea	183	—	183	•	
Taiwan	99	—	99	•	
Other Asia	525	2,295	2,820	0.3	
Total Asia, Australasia	178,187	133,303	311,490	29.9	169
Total world	519,733	524,131	1,043,864	100.0	235

Source: 1995 BP Statistical Review of World Energy

Table 18. World Coal Production (Unit: Million tonnes)

	Hard coal		Brown coal	
	1993	1994	1993	1994
United States	539.3	605.0	319.4	330.0
Canada	35.3	36.6	33.7	36.2
Germany	8.6	7.5	1.7	1.5
Western Europe	154.7	127.5	350.3	328.5
FSU	419.8	389.2	119.4	105.8
Russia	198.3	176.0	106.7	95.0
Eastern Europe	574.1	525.9	392.2	369.3
China	1,047.0	1,110.0	94.0	100.0
India	246.0	248.0	17.2	19.0
Australia	130.6	181.6	48.5	48.6
Asia	1,574.3	1,640.6	196.0	206.2
World total	3,107.8	3,181.2	1,291.6	1,270.2

Source: 1995 BP Statistical Review of World Energy

Table 19. World Coal Consumption [Part I—1984-1989] (Unit: Million tonnes of oil equivalent

Country/region	1984	1985	1986	1987	1988	1989
United States	430.2	440.5	435.0	453.8	475.0	476.9
Canada	32.3	29.3	32.6	33.4	30.5	27.5
France	25.2	23.0	19.6	17.9	17.1	19.6
Germany	147.4	147.6	143.4	141.3	140.1	138.2
Britain	47.3	62.9	67.9	69.6	68.0	65.9
Western Europe	304.7	322.4	326.6	330.5	325.3	328.9
FSU	322.6	322.6	330.2	335.6	327.0	312.7
Russia	—	195.6	200.4	205.1	200.8	194.4
Eastern Europe	524.4	527.4	539.0	548.8	538.0	516.8
China	388.5	417.0	434.1	449.1	468.4	504.9
Japan	69.9	73.7	69.5	69.4	76.2	75.6
Asia, Australasia	628.4	677.0	703.3	733.1	767.0	812.4
World total	2,011.2	2,089.2	2,131.7	2,197.1	2,238.8	2,262.4

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 19. World Coal Consumption [Part II—1990-1994] (Unit: Million tonnes of oil equivalent

Country/region	1990	1991	1992	1993	1994
United States	481.4	473.0	475.5	489.7	492.5
Canada	24.4	25.5	26.2	23.7	24.9
France	19.1	20.1	17.9	14.2	14.1
Germany	129.6	113.3	104.4	97.9	96.3
Britain	65.6	65.1	61.5	53.5	50.2
Western Europe	320.6	305.4	228.0	265.4	261.8
FSU	307.9	277.6	265.6	238.0	210.3
Russia	180.6	165.6	154.7	140.8	126.5
Eastern Europe	479.2	437.1	415.0	383.0	349.6
China	516.1	504.6	527.1	541.6	572.0
Japan	76.0	79.0	78.0	79.2	82.0
Asia, Australasia	830.7	826.4	856.1	878.0	917.6
World total	2,239.3	2,169.2	2,159.6	2,142.9	2,153.2

Table 20. World Nuclear Energy Consumption [Part I—1984-1989] (Unit: Million tonnes of oil equivalent)

Country/region	1984	1985	1986	1987	1988	1989
United States	89.0	104.2	112.4	123.6	143.1	143.8
Canada	13.5	15.6	18.4	19.9	21.4	20.6
France	49.3	57.8	65.6	68.5	71.1	78.4
Germany	22.3	29.9	27.6	29.9	33.4	34.3
Britain	13.9	15.8	15.2	14.3	16.4	18.5
Western Europe	121.3	145.0	156.1	158.7	169.4	179.9
FSU	37.1	43.2	41.5	45.7	55.7	54.9
Russia	—	25.6	27.1	31.1	32.5	33.1
Eastern Europe	44.4	52.3	52.1	58.6	70.4	69.8
China	—	—	—	—	—	—
Japan	33.3	37.8	43.1	49.2	44.5	48.4
South Korea	3.0	4.3	7.3	10.1	10.3	12.2
Taiwan	6.3	7.4	7.6	8.5	7.9	7.3
Asia	43.6	50.8	58.8	69.3	64.4	68.9
World total	314.5	371.7	401.7	433.7	473.2	487.9

Source: 1995 BP Statistical Review of World Energy

[Continuation] Table 20. World Nuclear Energy Consumption [Part II—1990-1994]
(Unit: Million tonnes of oil equivalent)

Country/region	1990	1991	1992	1993	1994
United States	156.7	166.4	168.0	165.7	173.6
Canada	18.8	21.9	20.8	24.2	27.8
France	81.0	85.8	87.3	95.0	92.8
Germany	39.3	38.0	41.0	39.6	39.0
Britain	17.0	18.2	19.8	23.1	22.9
Western Europe	189.8	197.0	200.2	210.1	209.3
FSU	54.6	54.7	54.3	53.4	45.0
Russia	30.5	31.0	30.9	30.7	25.3
Eastern Europe	69.5	69.1	68.2	67.5	60.6
China	—	—	0.1	0.4	3.1
Japan	50.7	54.4	56.6	64.6	67.3
South Korea	13.6	14.5	14.6	15.0	15.1
Taiwan	8.5	9.1	8.7	8.9	9.0
Asia	74.6	79.5	81.8	90.7	96.0
World total	515.0	539.9	544.8	563.6	573.1

Table 21. World Hydroelectricity Consumption [Part I—1984-1989] (Unit: Million tonnes of oil equivalent)

Country/region	1984	1985	1986	1987	1988	1989
United States	28.2	24.7	25.5	22.0	19.6	23.3
Canada	24.6	26.1	26.7	27.2	26.5	25.1
Norway	9.1	8.9	8.3	8.9	9.4	10.2
Sweden	5.9	6.1	5.2	6.0	5.9	6.1
Switzerland	2.7	3.2	2.9	3.0	3.1	2.6
Western Europe	38.3	38.2	36.3	38.8	40.6	35.9
FSU	17.4	18.4	18.6	18.9	19.9	19.2
Russia	—	13.7	14.1	14.0	13.8	13.7
Eastern Europe	21.8	22.7	22.9	23.3	24.5	23.5
China	7.2	7.7	8.4	8.6	9.4	10.2
India	4.6	4.5	4.5	4.2	4.7	5.4
Japan	5.9	6.9	6.6	6.7	7.0	8.0
Asia, Australasia	26.9	28.7	29.9	30.0	31.4	35.0
World total	169.9	173.1	175.2	176.4	179.3	180.0

Source: 1995 BP Statistical Review of World Energy

(Continuation) Table 21. World Hydroelectricity Consumption [Part II—1990-1994]
(Unit: Million tonnes of oil equivalent)

Country/region	1990	1991	1992	1993	1994
United States	24.6	24.2	21.1	23.3	21.4
Canada	25.5	26.5	27.2	27.7	26.8
Norway	10.4	9.5	10.1	10.3	9.8
Sweden	6.1	5.4	6.3	6.4	5.1
Switzerland	2.6	2.8	2.9	3.1	3.2
Western Europe	38.0	78.6	41.1	42.3	42.4
FSU	20.1	20.0	20.4	20.5	20.8
Russia	14.3	14.4	14.9	15.1	15.2
Eastern Europe	23.7	24.4	24.5	24.5	24.9
China	10.9	10.7	11.3	12.4	14.5
India	5.7	6.4	6.0	6.1	6.0
Japan	7.7	8.5	7.2	8.7	6.3
Asia, Australasia	35.6	37.0	36.1	39.6	39.5
World total	185.8	191.1	192.5	201.0	201.0

Table 22. World Power Generation Capacity at End of 1992 (Unit: MW)

Country/region	Total	Hydropower	Thermal power	Nuclear power
United States	797,448	92,296	705,152	
FSU	**344,000	65,000	241,100	37,900
Japan	***212,910	39,970	134,400	38,540
China	***182,911	44,593	138,318	—
France	115,226	24,883	25,532	64,811
Canada	108,700	61,993	32,720	13,987
West Germany	103,500	6,951	72,737	23,812
Britain	*70,017	4,179	54,485	11,353
Italy	61,625	19,351	42,274	—
Spain	45,415	16,700	21,315	7,400
Australia	*35,461	7,269	28,192	—
Sweden	35,272	16,499	8,470	10,302
India	*79,540	19,804	58,150	1,570
Korea	*24,571	2,445	14,510	7,616

Notes: * 1991 figures, ** 1990 figures, *** 1993 figures

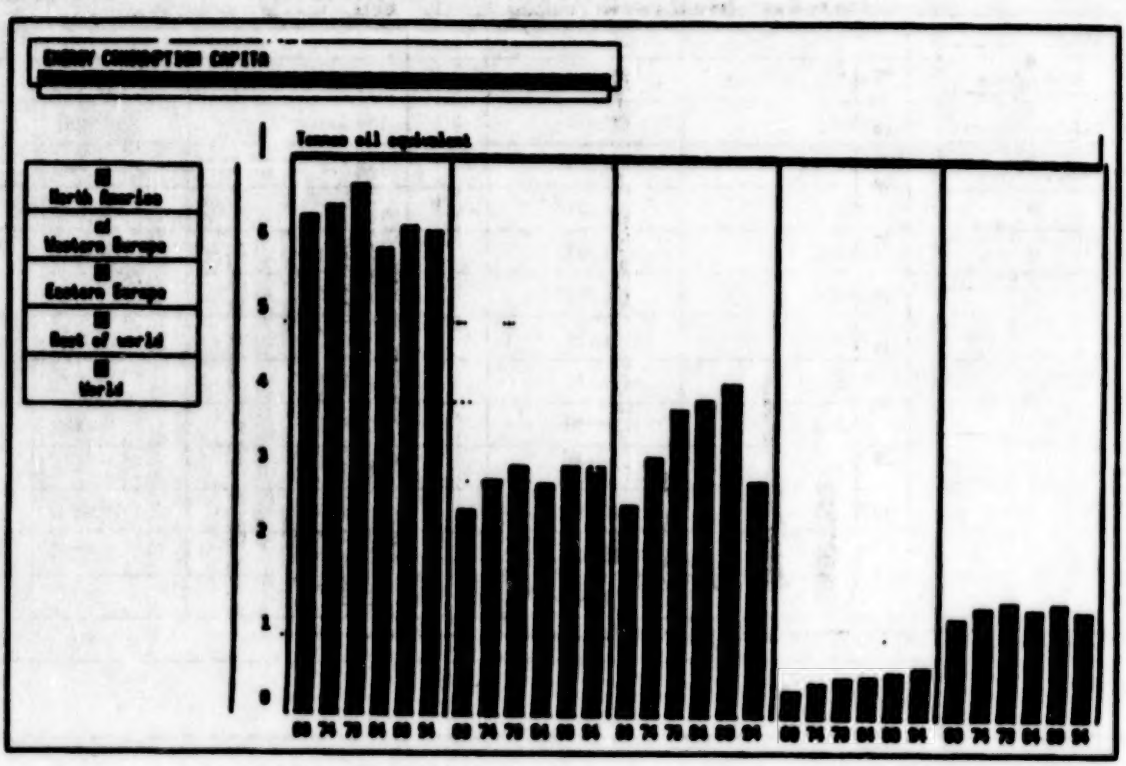
Table 23. World Electricity Output at End of 1992 (Unit: MW-hour)

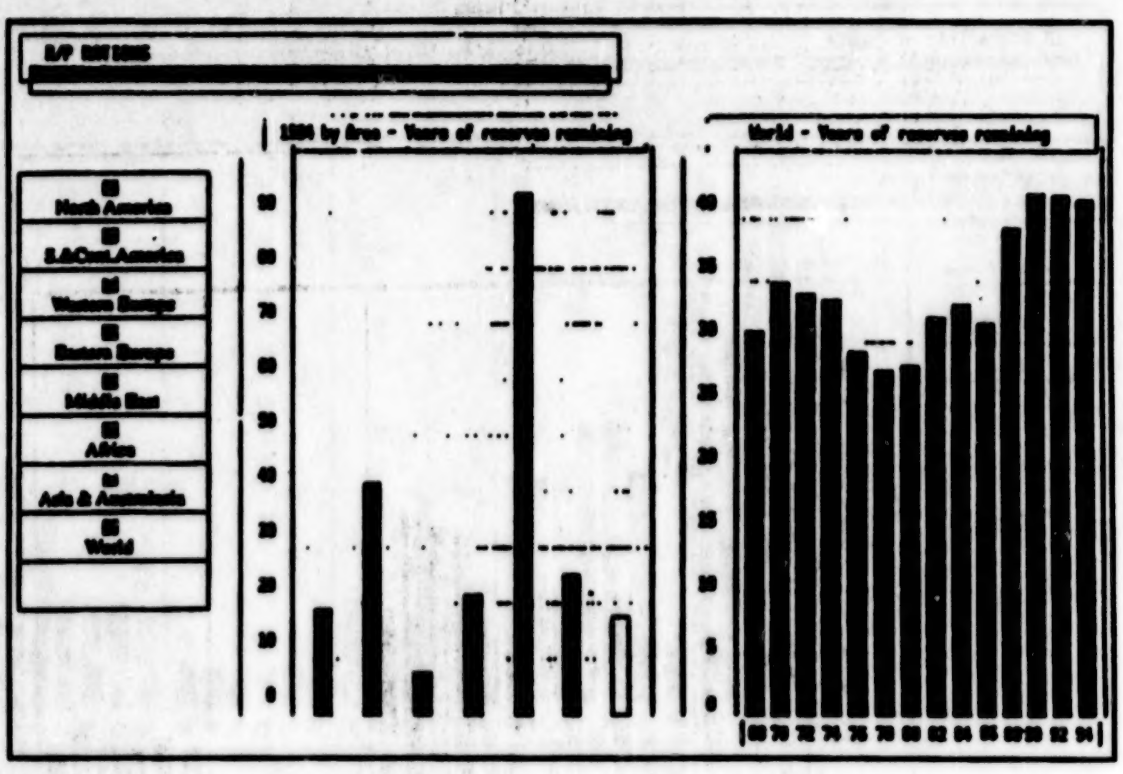
Country/region	Total	Hydropower	Thermal power	Nuclear power
United States	31,069.46	2,491.78	28,577.68	
FSU	**15,140.00	985	4,309	2,484
Japan	***7,778	896.16	5,823.91	2,232.59
China	***8,364.29	1,570.43	6,856.86	24.9
France	4,371.42	672.13	481.49	3,217.80
Canada	5,044.06	3,132.98	1,150.89	760.19
West Germany	4,624.22	194.93	2,841.25	1,588.04
Britain	*3,221.59	60.06	2,456.07	705.43
Italy	2,144.33	452.23	1,692.10	—
Spain	1,579.82	200.32	821.68	557.82
Australia	*1,568.83	161.03	1,407.80	—
Sweden	1,464.45	748.92	80.09	635.44
India	3,093.70	675.20	2,364.24	54.10
Korea	*1,322.28	50.51	708.66	563.11

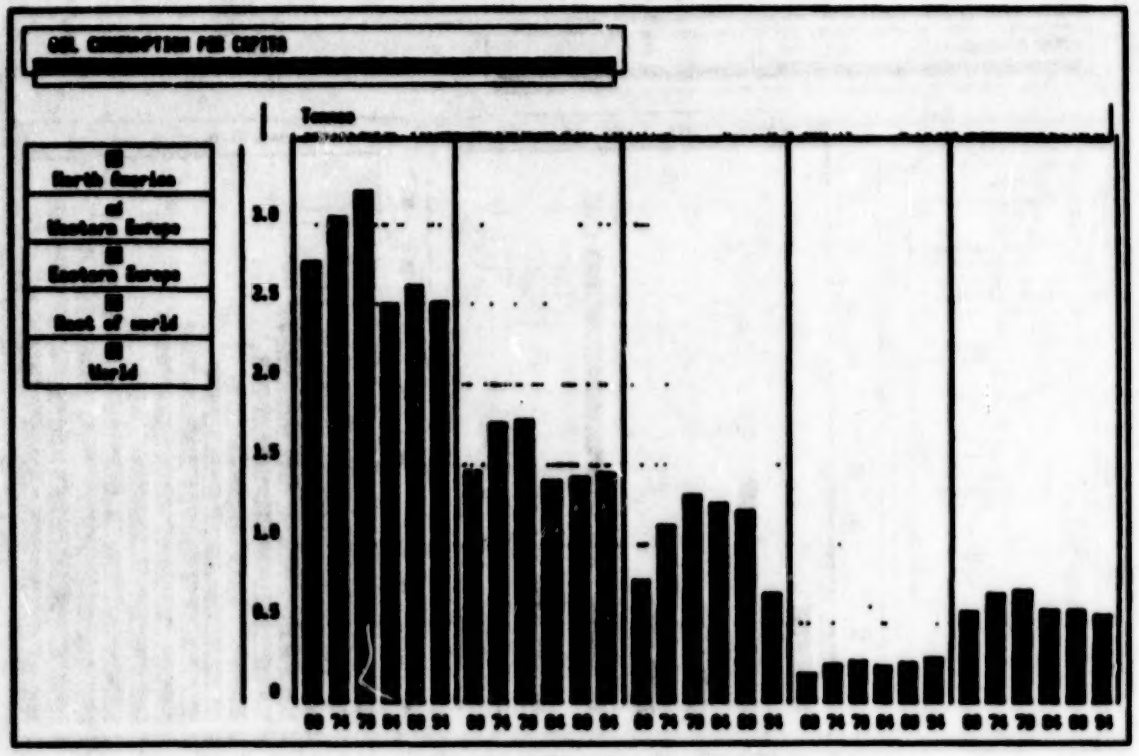
Notes: *1991 figures, ** 1990 figures, *** 1993 figures

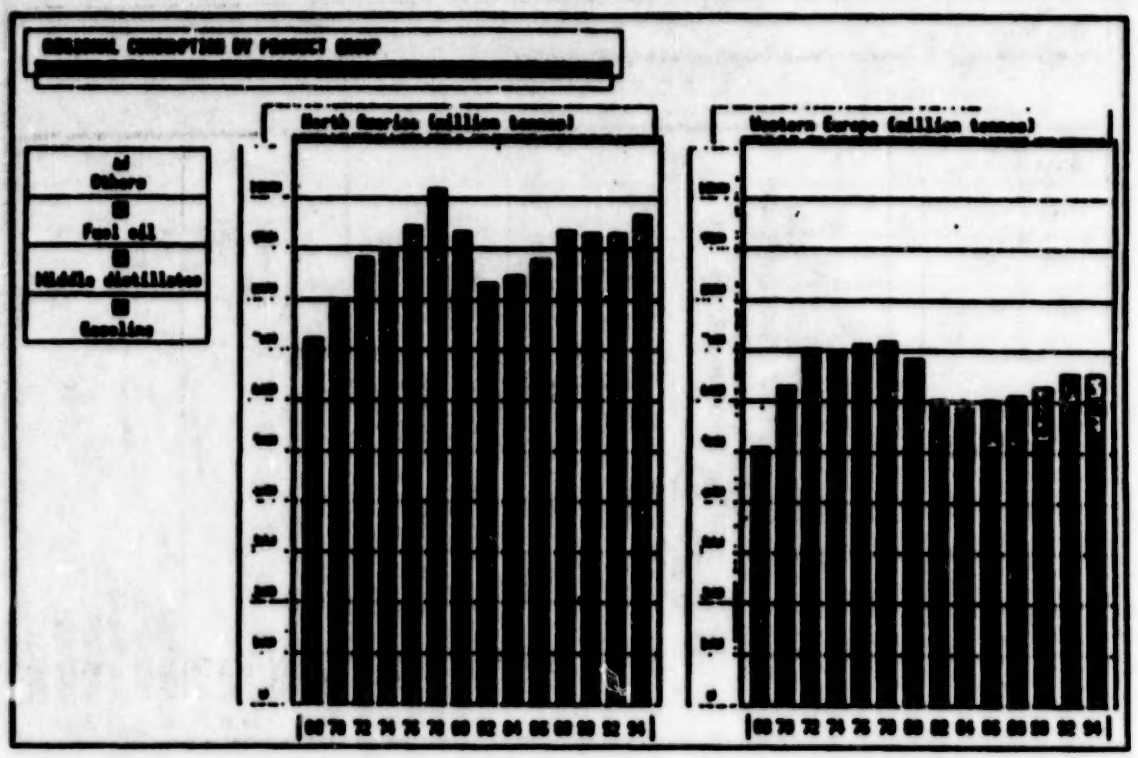
World Energy Plates

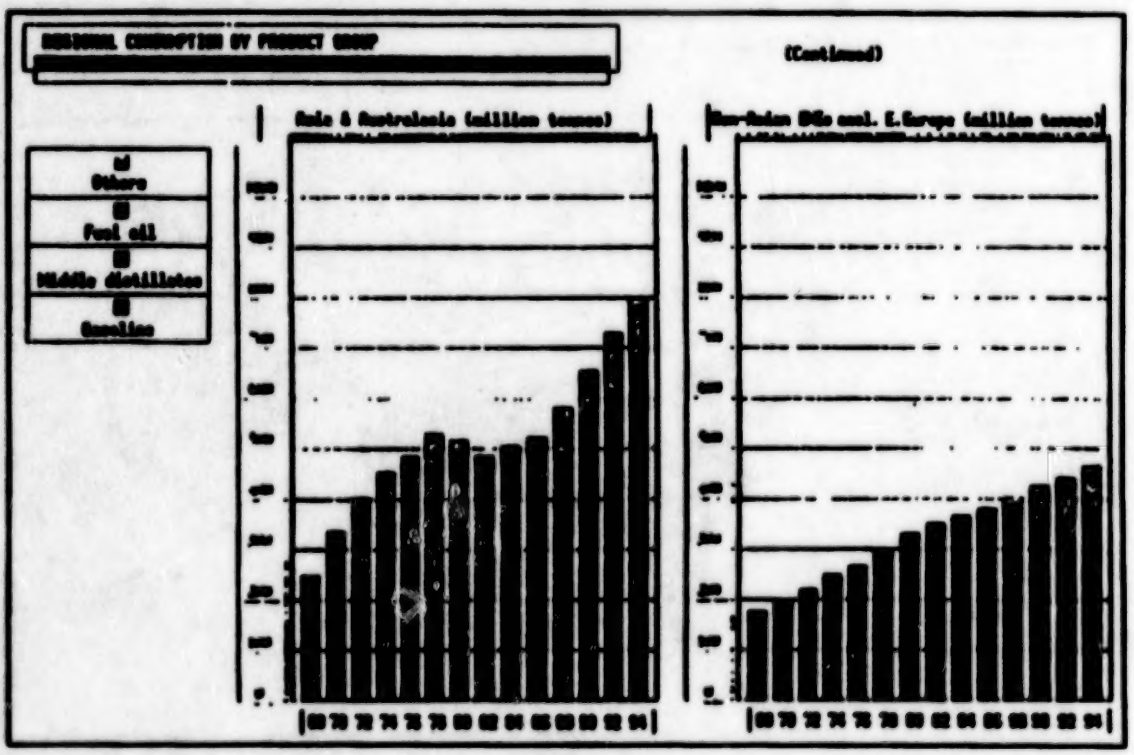
(Source: 1995 BP Statistical Review of World Energy)

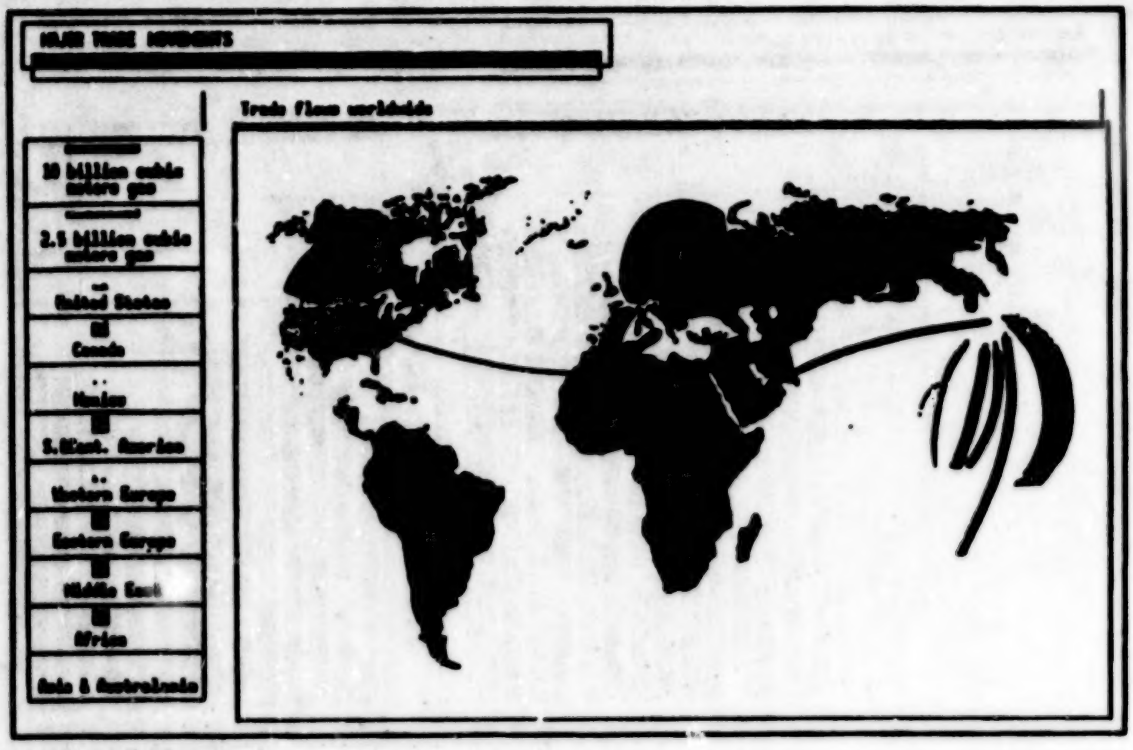


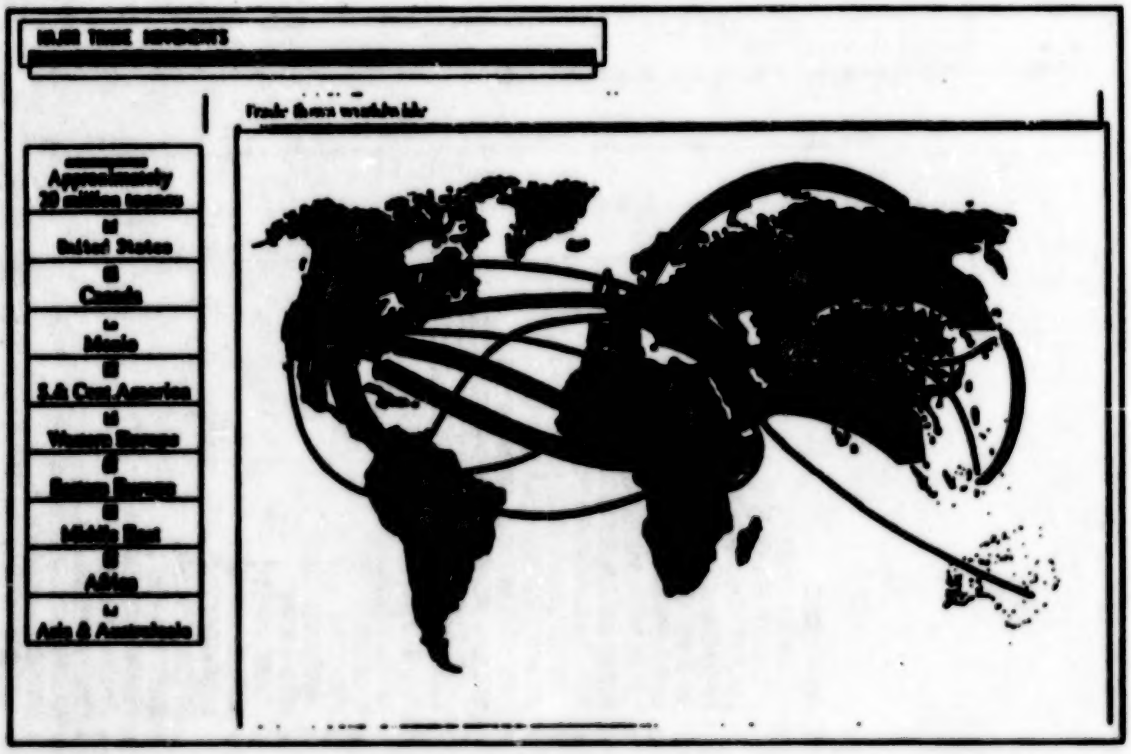


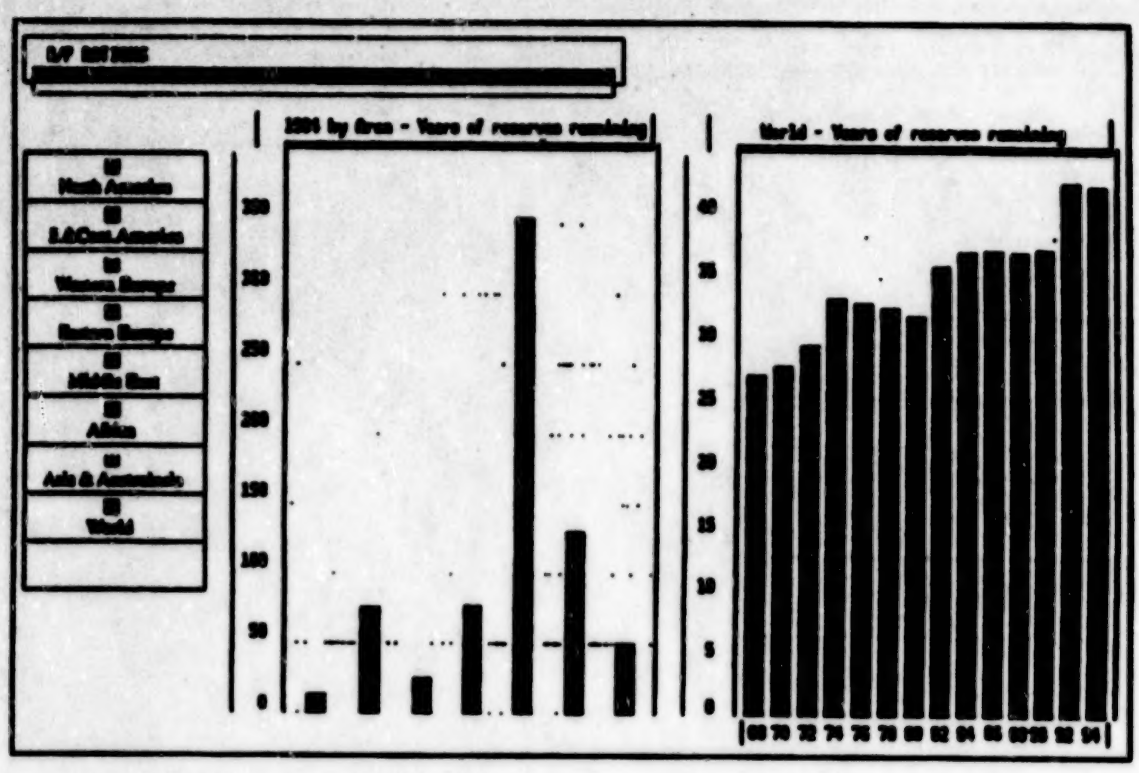


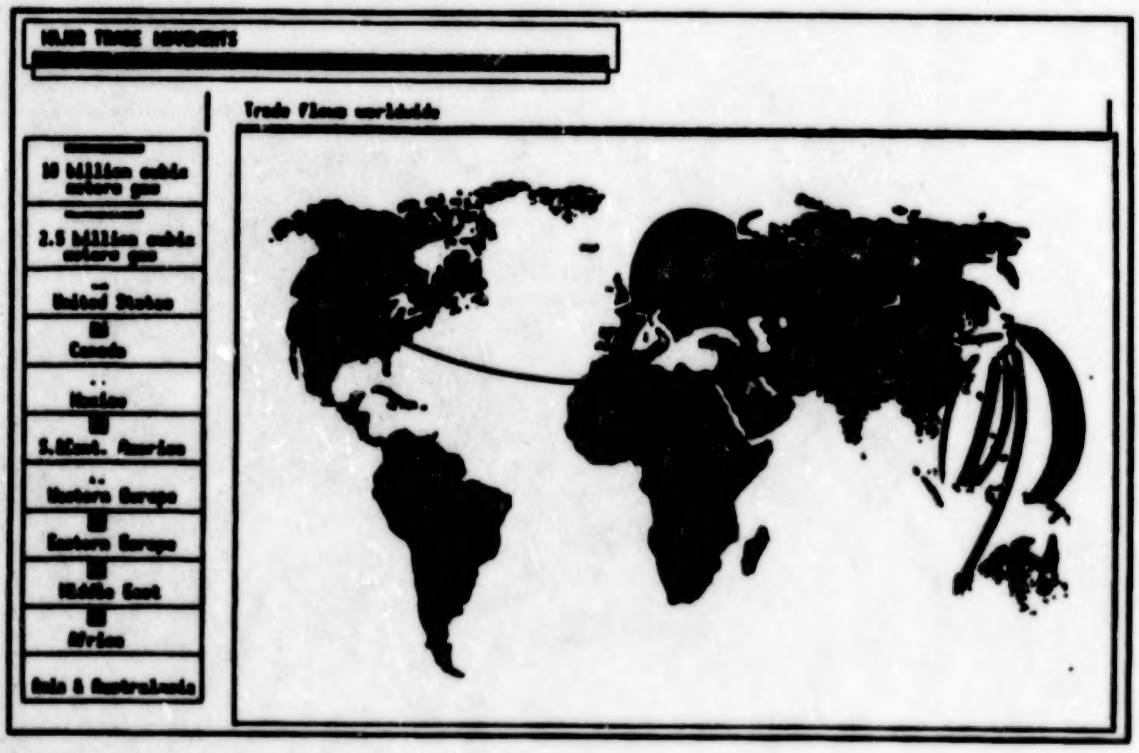












This is a U.S. Government publication produced by the Foreign Broadcast Information Service (FBIS). Its contents in no way represent the policies, views, or attitudes of the U.S. Government.

FBIS collects, translates, disseminates, and analyzes foreign open-source information on behalf of the U.S. Government. Its publications may contain copyrighted material. ***Copying and dissemination is prohibited without permission of the copyright owners.***

— Bracketed indicators before the first sentence of each item describe the way in which the material was processed by FBIS.

— Headlines and all bracketed explanatory notes are supplied by FBIS.

— Personal and place names are rendered in accordance with the decisions of the U.S. Board on Geographic Names as adapted by FBIS. Unverified names in radio and television material appear in parentheses and are spelled phonetically; words and phrases in parentheses preceded by a question mark are unclear in the original and deduced from context.

SUBSCRIPTION INFORMATION

U.S. Government Customers

For a list of FBIS products, to subscribe to an FBIS publication, or to indicate a change of address contact:

FBIS
P.O. Box 2604
Washington, DC 20013-2604
Telephone: (202) 338-6735
FAX: (703) 733-6042

Non-Government Customers

Subscriptions are available from the National Technical Information Service:

NTIS
5285 Port Royal Road
Springfield, VA 22161
Telephone: (703) 487-4630
FAX: (703) 321-8547

New subscribers should expect a 30-day delay in receipt of the first issue.

END OF FICHE

DATE FILMED

25 June 96